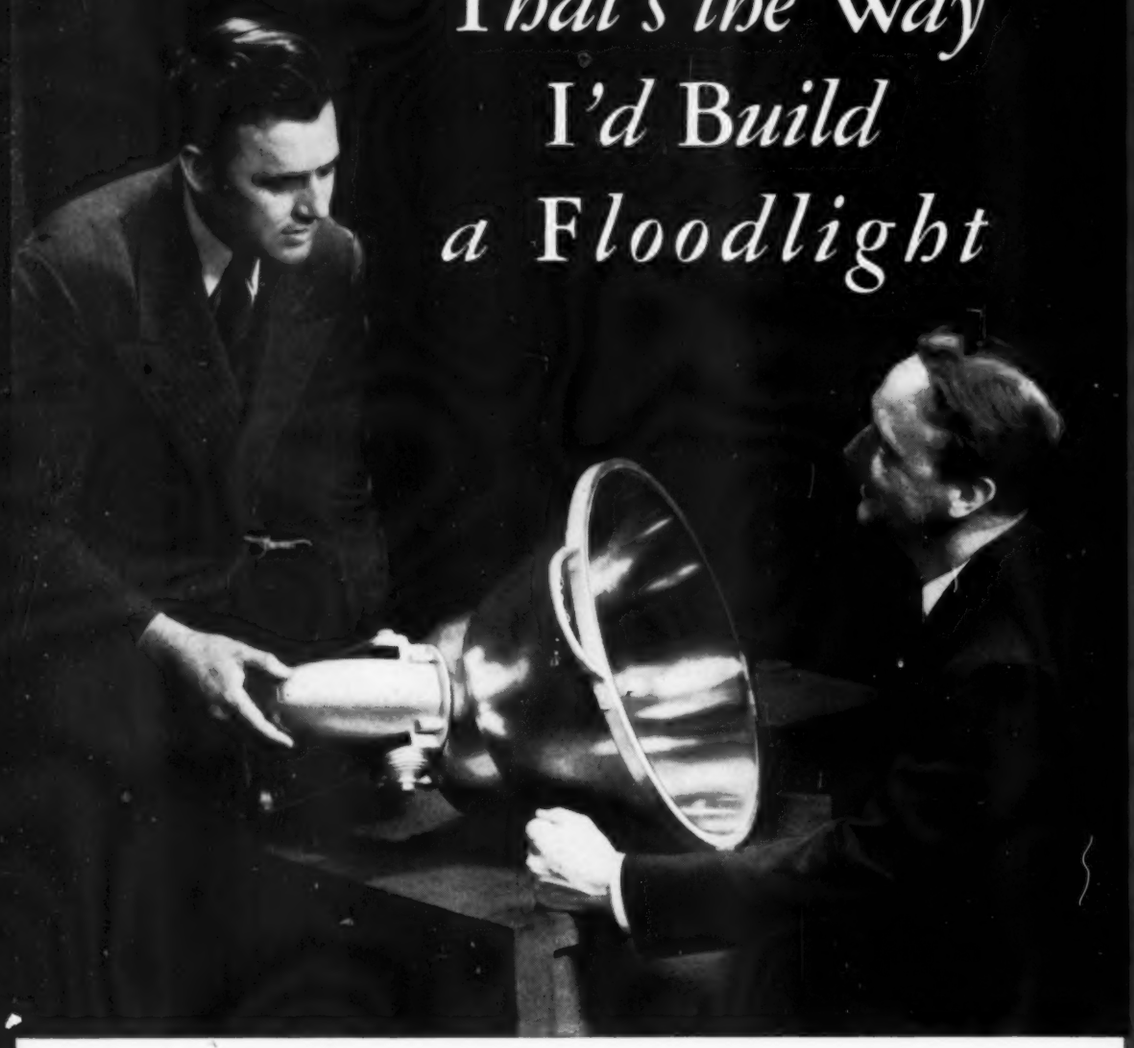
electrical contracting

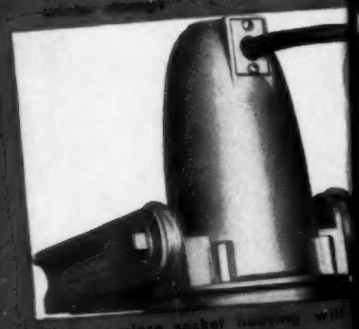
Industrial Electrification
SECTION
PA[illegible] 37-48

JULY • 1940

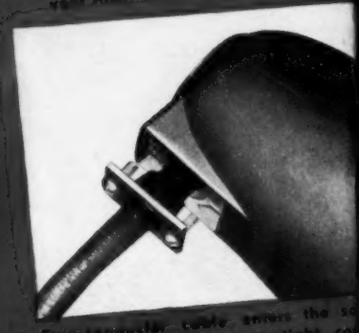
That's the Way I'd Build a Floodlight



Rear section of reflector is extruded to provide a flat metal-to-metal [illegible] between socket housing and reflector. Keyhole slots provide quick removal of the reflector for either replacement [illegible]



The one-piece socket housing will not allow water to enter and drip on lamp. Constructed of die-cast aluminum, does not require periodic painting to prevent rust.



Two-terminal cable enters the socket housing through a watertight connector rubber bushing. Strain on binding screws and wearing of cable insulation are eliminated.

Resetting ring makes relamping and servicing simple. The special reposition stop assures that the light returns to proper position.

Continuous 180-degree slot in the crossarm bracket assures that [illegible] will be drilled alike. Holding and positioning bolt on different levels [illegible] installation.

G-E Floodlights Are Built from the Buyer's Viewpoint

IF THE man who buys floodlights could draw up a set of specifications to best fulfill his requirements, you would find that General Electric floodlights meet those specifications completely.

For example, only in the G-E Type L-68 floodlight can you obtain the three features that make servicing easier—a 240-degree tip-over to raise the floodlight to servicing position, a repositioning stop for returning the unit quickly to the lighting position, and a slide-type door glass for easy removal and less breakage. These features have proved their worth on many installations—yet they cost you nothing extra.

Recommend G-E *Alzak aluminum floodlights on your next job—you'll find them easier to sell because, in addition to the trim appearance and high efficiency, these floodlights have many other extra-value features. You'll find installation easier, too—and profits larger. For complete floodlighting equipment or recommendations call the nearest G-E Office. General Electric, Schenectady, N. Y.

*Manufactured under Aluminum Company of America Patents

GENERAL ELECTRIC

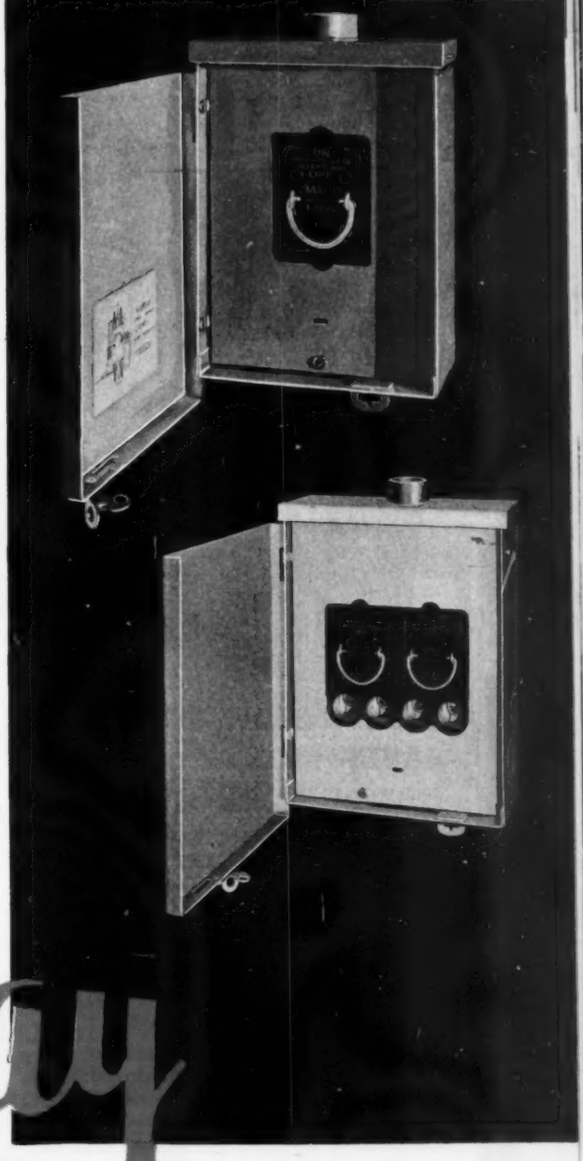
451-13

Indoor and Outdoor

NEW, smaller, better looking — with years-ahead *interior* design (left), giving much more wiring space than other types. Available as service *or* range switches, — or for service *and* range duty, (1) with a single switch for either; also (2) with separate switches, one for service and one for range duty; (3) with or without branch lighting circuits.

OUTDOOR types (right) differ from indoor only in box construction. The door, in closing, is slid *up* under the "roof," which overhangs the sides so deeply that the hardest storms stay out. Indoor and outdoor types equally easy to install.

SWITCH units of one-piece Bakelite — compact and practically indestructible. It is impossible to insert the pull-outs incorrectly. Metropolitan Device Corporation, Brooklyn, N. Y.



Murray

PULL-OUT TYPE
RANGE & SERVICE SWITCHES

METROPOLITAN DEVICE CORPORATION
1250 Atlantic Avenue, Brooklyn, N. Y.

Send information on pull-out type switches, as well as catalog of Murray Switches.

Name_____

Company_____

Address_____

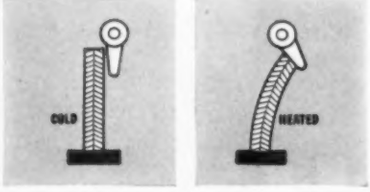
Mail for Switch Catg.

BI-METAL PROTECTS

Ask Your Westinghouse Representative For This Bi-Metal Demonstration

MAKE THIS TEST YOURSELF . . . A strip of Bi-Metal and a match are all you need to prove to yourself the time and moneysaving advantages of Bi-Metal Protection. Ask your Westinghouse Representative for a Bi-Metal Demonstration Kit and make the test yourself.

HERE'S HOW BI-METAL SAVES MONEY . . . GIVES BETTER PROTECTION

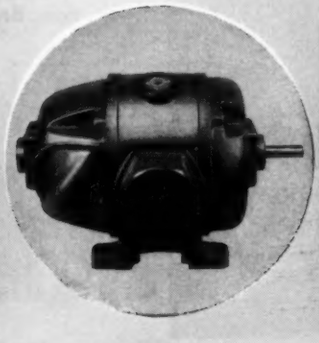


Two different metals bonded together, when heated always bend in the same direction. The heat from short circuit or continued overload currents causes the Bi-Metal, which is exactly calibrated to the job at the factory, to act and open the circuit. Because of Bi-Metal's characteristics, its accuracy never changes, regardless of the number of operations. There's nothing to replace . . . nothing to wear out.

YOU PAY NO MORE FOR BI-METAL PROTECTION IN THIS WESTINGHOUSE EQUIPMENT

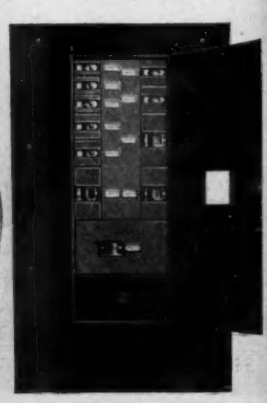
NOFUZE CIRCUIT BREAKER

Bi-Metal eliminates fuses. Breaker operates with cabinet closed. "De-ion" arc quenchers. Accurate overload protection.



THERMOGUARD MOTOR

Single-phase sizes up through 2 hp. Prevents motor burnouts. Bi-Metal gives positive protection at all times.



LIGHTING AND POWER PANELBOARDS

Bi-Metal protects circuits and eliminates fuses. "De-ion" arc quenchers save contacts. Tamper-proof.

Westinghouse

W
WESTINGHOUSE ELECTRIC

BOTH MOTOR AND CIRCUIT

NEW SAFETY LOCK . . . a single padlock locks both switch "Off" and cabinet "Closed". Safety interlock prevents door from being opened with power "On".

NOFUZE

COMBINATION LINESTARTER PROVIDES:

1. Magnetic motor starter
2. Manual disconnect switch
3. Motor overload protection
4. Fuseless Circuit protection

ALL IN ONE COMPACT UNIT

Here's your answer to motor circuit protection . . . all in one streamlined package. You save all around, save on wiring cost, save on conduit, save on installation time.

Bi-Metal in the Nofuze Breaker protects the circuit . . . Bi-Metal in the starter protects the motor. You save on maintenance costs because there is nothing to renew or replace. Outage time is reduced because workers restore service without waiting for maintenance men. Trouble-free operation is assured because Bi-Metal is tamper-proof.

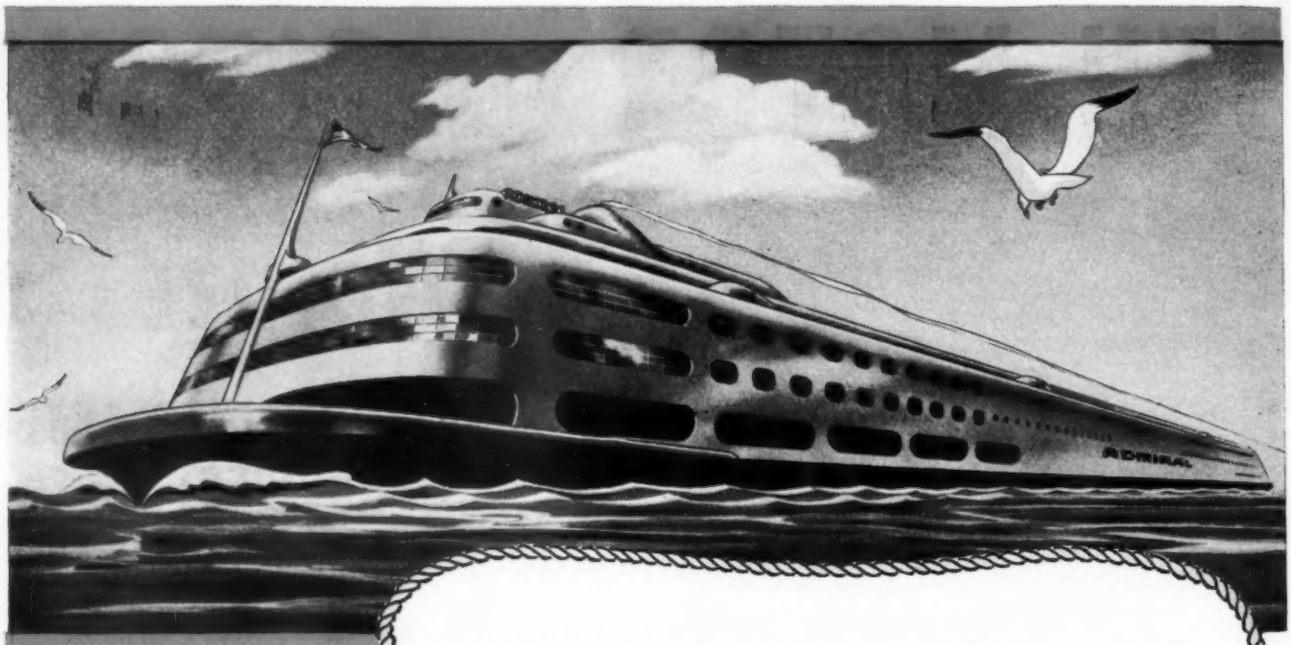
"DE-ION" ARC QUENCHERS ON BREAKER AND STARTER CONTACTS

Westinghouse "De-ion" arc quenchers confine, divide and extinguish the arc instantly . . . preventing burning and prolonging the life of contacts.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

J-90334

Motors and Control



ASHORE OR AFLOAT

Ⓕ Switchboards and Panelboards for Power and Light are included in the elaborate electrical equipment on the all-steel, streamlined, air-conditioned S.S. ADMIRAL — the finest pleasure steamer afloat. Built, owned and operated by Streckfus Steamers, Inc., St. Louis, Mo.

Ⓕ Type LNT1P-3L Panelboard for Lighting and Appliance Branch Circuits.

Ⓕ Type PFS-3HL Panelboard for Power Branch Circuits.

Ⓕ Equipment not only serves faithfully and well in residences, commercial and industrial buildings; it is specified when dependable products are needed afloat — as on the sumptuous S.S. Admiral. With thousands of happy excursionists aboard each day, perfect functioning of light and power must be assured.

It is fully as essential that homes, offices, stores and factories be equally protected. And because Ⓕ Products are *built better than necessary* many architects, engineers and contractors choose them for the job. Designed and built by men of long experience, they render service far beyond their cost. First costs are reasonable — maintenance is negligible.

Call on the Nearest Ⓕ Sales-Engineer

for detailed information and estimates. By long training he is equipped to serve you — and without obligation. If you don't know his name, write us.

There is a Wholesaler Near You

who carries many Ⓕ items in stock, ready for quick delivery. We'll gladly tell you where to find him. . . . Frank Adam Electric Company, St. Louis, Mo.

EST. 1891 THE SIGN OF A FA BETTER JOB

Frank Adam

PANELBOARDS

FRANK ADAM ELECTRIC CO. ST. LOUIS, MO. U.S.A.

electrical contracting

With which is consolidated The Electragist and Electrical Record
Established 1901

Contents

JULY, 1940

7—National Defense—Our Responsibility—*An Editorial*

9—Designed for Flexibility—*By Geo. E. Scholes*
—This factory secured a flexible power and lighting distribution system.

12—Two and One Half Years of Progress
—A brief report of what the National Adequate Wiring Bureau has accomplished in its campaign of promotion work.

14—When a Customer is Sore—*By Lewis Hudson*
—Seven suggestions, based on the experience of other business men, to win back dissatisfied customers.

15—New Wiring Fills Hotel
—How an electrical contractor took some modern ideas and did a good selling job.

16—Combination Lighting in a Department Store
—Fourth in a series on fluorescent lighting design, application and installation.

18—Your Fire Insurance—*By Arthur Roberts*
—Some points to look for when you buy insurance protection.

20—Editorials and Back Talk

37—Industial Electrification—*A Feature Section*
—A new series on industrial electrical problems.

Departments

24—Wiring Methods
28—Motor Shop
32—Better Lighting
51—Estimating
54—Questions on the Code
58—In the News
74—Equipment News
82—Advertisers' Index

EARL WHITEHORNE
Editor

W. K. BEARD, JR.
Manager

ALICE McMULLEN Assistant Editor
AUGUST ECKEL Eastern Editor
W. T. STUART Middle West Editor
W. A. CYR Pacific Coast Editor
HARRY PHILLIPS Art Editor

McGRAW-HILL PUBLISHING COMPANY, INC.
JAMES H. McGRAW, Founder and Honorary Chairman
Publication Office, 99-129 North Broadway, Albany, N. Y.
Editorial and Executive Offices, 330 W. 42nd St., New York, N. Y.

JAMES H. McGRAW, JR., President; HOWARD EHRLICH, Executive Vice-President; MASON BRITTON, Vice-Chairman; B. R. PUTNAM, Treasurer; D. C. McGRAW, Secretary; J. E. BLACKBURN, JR., Director of Circulation. *Branch Offices:* 520 North Michigan Ave., Chicago; 68 Post St., San Francisco; Aldwych House, Aldwych, London, W. C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta. Published monthly, price 25 cents a copy. Vol. 39, No. 7. Allow at least ten days for change of address. All communications about subscriptions should be addressed to the Director of Circulation, 330 West 42nd Street, New York, N. Y. Subscription Rates—U. S. A., Canada and Latin-American republics, $2.00 a year, $3.00 for two years, $4.00 for three years. Great Britain and British Possessions 18 shillings for one year, 36 shillings for three years. All other countries $3.00 a year, $6.00 for three years. Entered as second-class matter August 29, 1936, at Post Office at Albany, N. Y., under the act of March 3, 1879. Printed in U. S.

Copyright 1940, by McGraw-Hill Publishing Company.

Cable address: "McGrawhill, New York." Member A. B. P. Member A. B. C.

A SERVICE PAPER for electrical contractors, engineers, motor shops, industrial electricians and inspectors, covering engineering, installation, repairing, maintenance and management, in the field of electrical construction — industrial, commercial, and residential.

DID YOU FIND A GOLD MINE? That new truck must have cost you plenty!

YEAH! RIGHT IN THE PAGES OF THESE BOOKS. Without Anaconda's Wiring Survey and Guide, I doubt whether you'd see a new truck out there. Since I started using them two months ago, I have landed two modernization jobs, each one well up in four figures. Naturally, I used Anaconda Duracode for re-wiring both, not just because Anaconda helped me out with these books but because—in case you don't know it—Duracode is an all-purpose building wire with a perfect operating record.

Say, you've been crying poor mouth since the first of the year! How come you haven't got these books from your Anaconda distributor? When I got mine, the distributor told me that more than $300,000,000 was being spent this year for Electrical Modernization. That's plenty for all of us!

ANACONDA
from mine to consumer

Without obligation send me a copy of Anaconda's new Wiring Survey.

*Company Name*_____

*Address*_____

*Title*_____

40830

If you are unable to obtain copies of the Wiring Survey from your Anaconda Distributor, use this coupon!

Visit the Copper & Brass Industry Exhibit in the Hall of Industry, New York World's Fair—1940.

© N. Y. W. F.

USE MODERN IMPROVED

Anaconda Wire & Cable

ANACONDA WIRE & CABLE COMPANY, General Offices: 25 Broadway, New York City; Chicago Office: 20 North Wacker Drive

Subsidiary of Anaconda Copper Mining Company. Sales Offices in Principal Cities

electrical contracting

JULY, 1940

National Defense—Our Responsibility

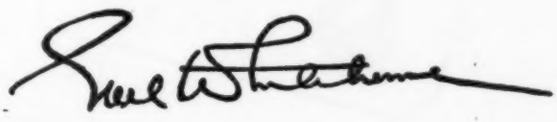
AMERICA, WATCHING THE SWIFT CONQUEST of the European continent by Germany, stands rubbing her eyes. And she suddenly awakes to find that our own National Defense belongs to military tactics of the past. We need planes, tanks, guns and ships. Most of all we need industrial plants to produce them. Not some day, but now. The government calls upon the people to prepare for war. And along with other Americans, electrical men are saying: "What can I do?"

LET'S TAKE A MINUTE AND THINK ABOUT THIS. Industrial preparedness means more factories. It means more factories better equipped and ready to build munitions of war. And the chief problem that besets the manufacturer at the moment is how to readjust his production and increase his output in order to make his quota of munitions in addition to his own line. This means new plants, new machines, new buildings, new lighting for all night operation.

IT MEANS BASICALLY THE GENERAL REPLACEMENT of old equipment and the improvement of old structures. Now this is not a new problem to us. It is, in fact, our same old process of industrial modernization. It means putting in increased capacity, efficient illumination at every work spot, more modern control that saves steps and time, and better applications of more efficient motors. It means the re-engineering of industrial plants so that the right electrical machinery for each process will be at work. It means the same old selling job. But cast on an entirely new plane.

THE OPPORTUNITY OF THE ELECTRICAL MAN in the present program for preparedness is a highly important and interesting one. It is his responsibility, his opportunity, his privilege now to call upon the manufacturers of America, one by one, town by town and discuss with them the known weaknesses of their present electrical systems, to survey each plant, to recommend what should be done to do the job.

OUR PLACE IN THIS GREAT PREPAREDNESS PROGRAM offers us no baffling problem. We are prepared to play our part promptly. And the importance of that part will be recognized as soon as we present it to the factory men in our community.



"We find that GRAYBAR is the promptest supply source for the better grade of wiring specialties that our industrial jobs call for,"

—said Contractor J_____T_____

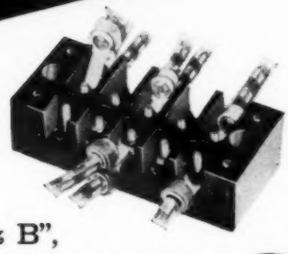
(No. 18 in a series of 10-second "quotes" from typical Graybar customers.)

Install HUBBELL *Twist-Locks* to hold INDUSTRIAL CUSTOMERS

Right now, your industrial customers are looking for "sure-power" connections wherever plugs and outlets are to be installed. They'll gladly pay a little more to avoid interruption and delays in the use of motor-driven tools and other portable electrical equipment.

So, now's the time to show them how the *"Twist-Lock"* feature and sturdy construction of Hubbell devices assures uninterrupted operation even under "slam-bang" treatment in the shop. Send coupon for free literature that gives the whole story on this profitable line.

Modernize YOUR WIRING METHODS with these T & B CONNECTORS



When you "go T & B", you're set to make quick yet positive solderless connections of wire, cable, rod, tubing and bar. Safe and easy to install, they aid in doing the clean-cut kind of a wiring job that brings "repeat" business from critical industrial customers.

"Wedge-On" wire splicers are particularly adapted to line, junction box, motor lead, outlet box and service entrance splices. "Wedge-On" lugs (right) are ideal for control wire installation and on terminal blocks. The coupon brings 100-page T & B catalog giving full specifications.

GRAYBAR
IN 83 PRINCIPAL CITIES
Executive Offices:
Graybar Building, N. Y.

Graybar QUALITY Since 1869 — *Everything Electrical* — Graybar ELECTRIC COMPANY

Graybar Electric Co. — Graybar Bldg., N. Y.
Please send information on

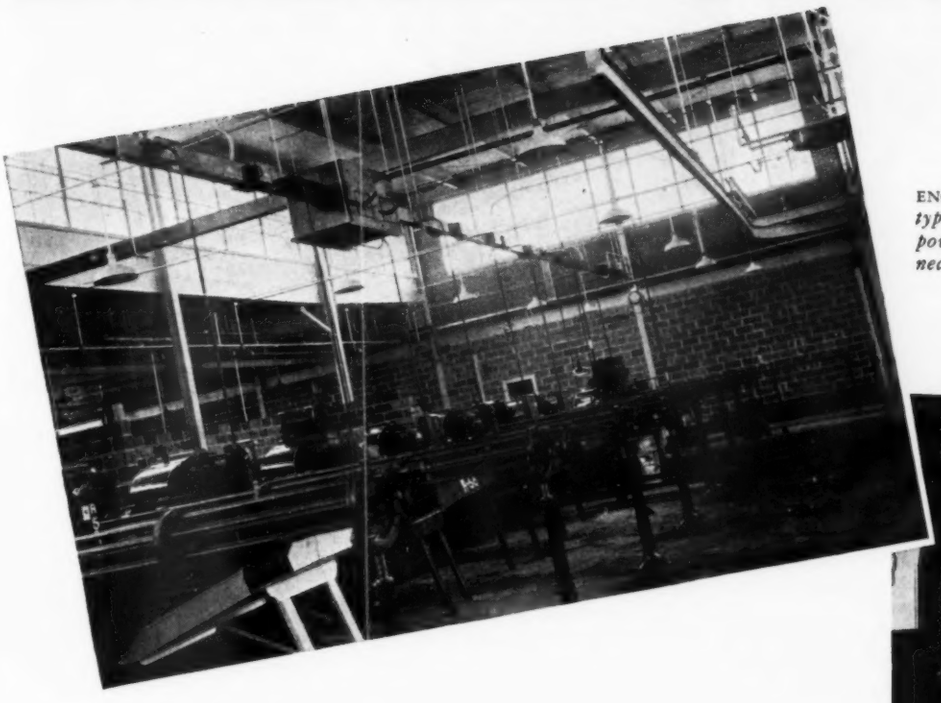
☐ Hubbell Twist-Lock ☐ T & B Connectors

Name_____

Position or Dept._____

Company_____

Address_____



ENCLOSED BUSDUCT *of the "plug-in" type provides maximum flexibility to the power distribution. Short conduit connections drop from the power taps to the motor starter.*

Designed for *Flexibility*

By George E. Scholes
Vice President and General Manager Garden Electric Company, Inc., Elizabeth, N. J.

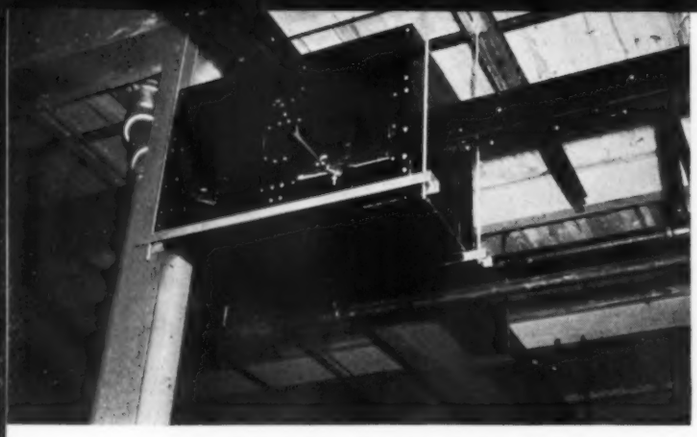
This New Jersey manufacturing plant required a flexible power and lighting distribution system in order to allow for the frequent rearrangement of its production machinery and lighting layout. This bus-type installation illustrates one method of meeting these requirements.

WHEN the Elastic Stop Nut Corp., of Elizabeth, N. J., decided to expand and build a new 60,000 square foot manufacturing plant at Union, N. J., its engineering department began looking for an electrical system that would provide much-needed installation ease, salvability and flexibility, from the standpoint of both machinery and lighting rearrangement and future plant expansion. The nature of their product and the markets they serve, especially the aviation industry, demand that frequent rearrangement of production machinery, adjustment of the mass production schedule and rapid building expansion be possible.

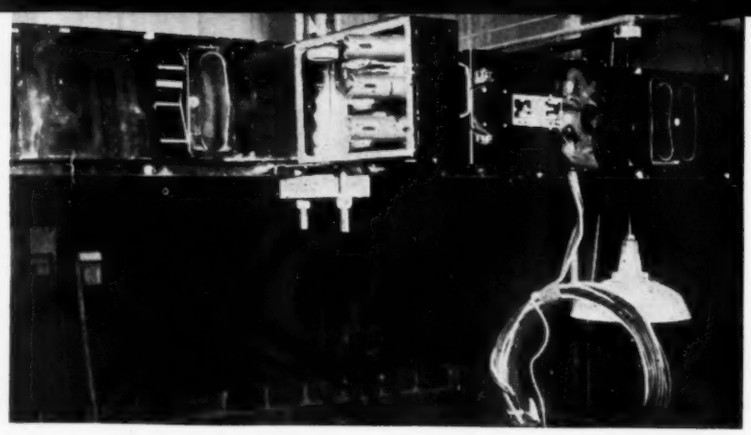
The final selection was Bulldog "Plug-in" Bustribution for power and Trol-E-Duct for the lighting circuits. Since a major portion of the production machines have individual machine lights, a three phase, four-wire distribution system was chosen. Flexibility, with an eye to future expansion, was the keynote of the complete design from the primary entrance breaker down to the individual outlets.

Primary power enters the building at 4150 volts, three phase, four-wire, goes through cubicle enclosed hook operated primary disconnects and a 600-ampere, 15-kv. primary oil circuit breaker to an outdoor transformer mat containing three 150-kva, 2300/4150 volt primary, 120/208 volt secondary oil insulated transformers. The primary service enters overhead in high tension cables enclosed in galvanized conduit and goes out to the transformers underground with high tension paper insulated lead covered cables in galvanized conduit.

From the transformers, secondary power enters the building through overhead copper buses and feeds the secondary switchboard which contains two 2,000 ampere, three pole air circuit breakers, each of which feeds a 1,000 ampere main feeder circuit to the main bus duct. Two ¼- by 4-inch copper buses per leg provide 2,000 ampere capacity to the incoming secondary buses which are supported on a high pipe framework to facilitate the future installation of larger transformers, if necessary. The buses enter the building through an opening in the brick wall which is covered by a split ebony asbestos panel mounted to the outer side of the wall and painted with an insulating mastic cement to prevent water from entering along the buses.



FOUR-WAY INTERSECTION *of two sizes of power duct is accomplished with a twin adapter. Adapter can also be used to sectionalize branches.*



POWER TAP *for motor or Trol-e-duct connection is provided by "plug-in" opening in the duct and the fusible swing plug.*

The main switchboard, located in a separate switchboard room, contains the primary oil circuit breaker and disconnects; a metering panel on which is mounted the utility graphic demand meter, watthour meter, time clock for the night rider and two ten point test switches. The owner's metering equipment includes a graphic demand meter and one ten point test switch. A set of three ground detector neon lamps is also mounted on this panel. The metering transformers are mounted on the incoming secondary buses just inside the building wall, giving plenty of headroom behind the board and at the same time leaving the rear of the metering panel free for meter wiring only. The distribution end of the switchboard contains the two secondary air circuit breakers mentioned before.

Provisions for future plant expansion are made in the switchboard room by leaving space for the installation of two additional primary oil circuit breakers. From these breakers, primary feeders would then be installed to a central point in the future plant additions. New transformer mats and secondary switchboards would be located at these points to feed the new secondary distribution systems. Main control of the entire plant electrical system would then be accomplished by having all the primary breakers in this original switchboard room. Provisions are also made in the present primary breaker for primary metering which would be employed in the case of future plant expansion.

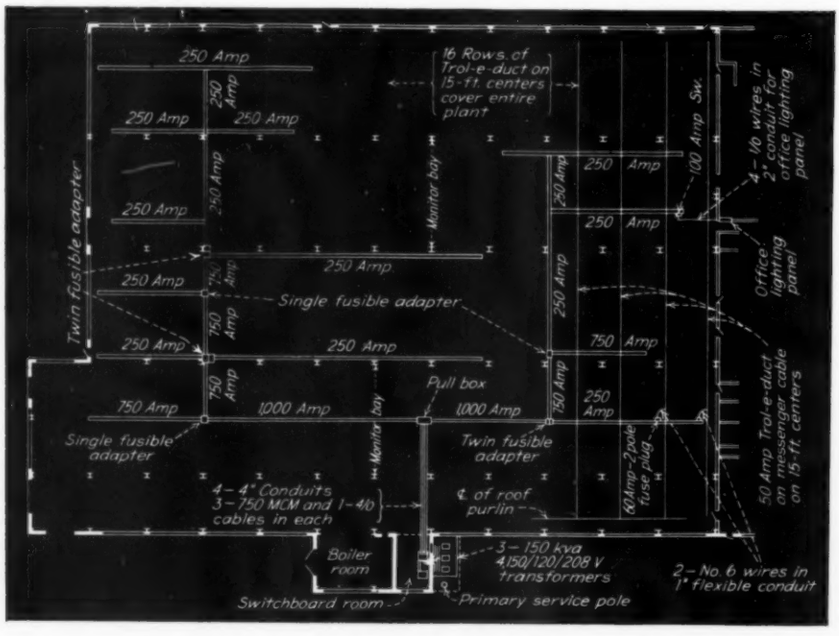
From the present secondary switchboard, power is distributed at 208-volts, three phase and lighting at 120-volts, single phase over a three phase, four-wire grounded neutral system. Two 1000-ampere, three phase, four-wire circuits from the secondary breakers feed the main distribution duct. These circuits consist of two 750,000 CM cables per phase leg and two No. 4/0 cables per neutral leg, all rubber covered and enclosed in four 4-inch galvanized conduits terminating in a large pull box at the duct system. Here they are connected to two main runs of 1000-ampere, three phase, four-wire Bustribution "Plug-in" duct. All branch duct runs are also of the "Plug-in" type.

From these main duct runs, branch circuit runs of 750- and 250-ampere duct are tapped off through fusible adapters and cover the rest of the plant production area.

Fusible "swing plug" power taps can be mounted on all the duct runs for the power connection of the various machines; also for feeding the lighting circuits. Rubber covered wire in conduit is run from the fusible plug down to the starting equipment of the machine which, in general, is mounted directly on the machine and located below the duct power taps.

Lighting distribution is accomplished through the use of 16 rows of 50-ampere, two pole Trol-E-Duct mounted on messenger cable strung across the entire width of the building. These rows are on 15-foot centers. Two No. 6 rubber covered wires in 1-inch flexible conduit feed each run of Trol-E-Duct from fusible "swing plugs" mounted on the power duct. RLM fixtures of 200-watt size and of both the open and glassteel diffuser type, mounted on trolleys with conduit stems and aligners, slide along the duct and are spaced on 16-foot centers. Once production is started, this spacing can be varied to suit specific requirements by simply pushing the trolley mounted fixture to a new location. If more fixtures are needed to increase the illumination intensity, additional ones mounted on similar trolleys can be inserted into the duct and spaced according to the new arrangement.

The question of capacity doesn't arise, since each run of the duct is rated



DISTRIBUTION DIAGRAM *showing the Bustribution and Trol-E-Duct feeders for power and lighting in the manufacturing area of this plant. Note fusible adapters for reducing duct sizes.*

at 50-amperes and fixtures can be added until that capacity is reached. Or fixtures of larger wattages can be used on the present spacings. The fixtures mounted on the duct are used for general illumination only, since each machine has its own individual light for close work. These machine lights are mounted on the conduit feeding the motor and fed from the same circuit, the outside leg and the neutral being used for the lighting. This eliminates a maze of additional plug taps and wiring for the machine lights. Individual circuits for the production area lavatories are taken directly from the Trol-E-Duct through a trolley mounted connection box. The lighting distribution panel for the office section of the building is fed by wire and conduit from a 100-ampere vacu-break fusible switch plug mounted on the power duct.

System Capacity

The present connected power load consists of 250 motors ranging in hp. size from ½ to 40 and totals 750 hp. This includes the motors driving 3 1000-ampere, 12-volt and 3 500-ampere, 45-volt motor-generator sets for the electro-plating department. The majority of the motors drive a large number of screw cutting and tapping machines while others drive air compressors, grinders and other auxiliary equipment. The total plant lighting load, including that of the office and engineering departments, is 50 kw. With this load, only 60 per cent of the distribution system capacity is utilized, leaving the other 40 per cent for the installation of additional equipment or motors of larger size on existing machines. Approximately 1020 feet of the Bustribution duct was installed. Since power taps are available on both sides of the duct at 24-inch intervals, this power system provides more than 1000 outlets for connecting motors. Of this number only about 250 are being used now for power and about 17 for feeding the lighting distribution system. There is plenty of flexibility and additional capacity here—just what the owners were looking for.

Installation Problems

Only two major installation problems were encountered by our mechanics in making this installation. Both were mounting problems, one on the Bustribution duct and the other on the Trol-E-Duct. Both were brought about by the construction of the building, and were easily solved by the men in the field. The building, 200-feet wide and 300-feet long, is of brick, steel and glass construction with the windows rising up to the roof steel on both sides. Two 40-foot monitor bays with a 27-foot elevation run the entire length of the building.

The main 1000-amp. duct in the center of one of these bays, 14-feet above the floor level, and the branch runs cross the bays as well as run down the center. Trapeze type hangers made of 3-inch channel iron and ½-inch bolt rod and mounted on ten-foot centers were used to support the duct. Each channel support had two ½-inch bolt rods fastened to the monitor roof steel by "C" clamps. Minute adjustments for leveling the duct were made by tightening or loosening the two nuts on the bolt rod on the channel end of the hangers. This type hanger was used to support the duct as well as the heavy conduit feeders and fusible adapters in the low bay areas also.

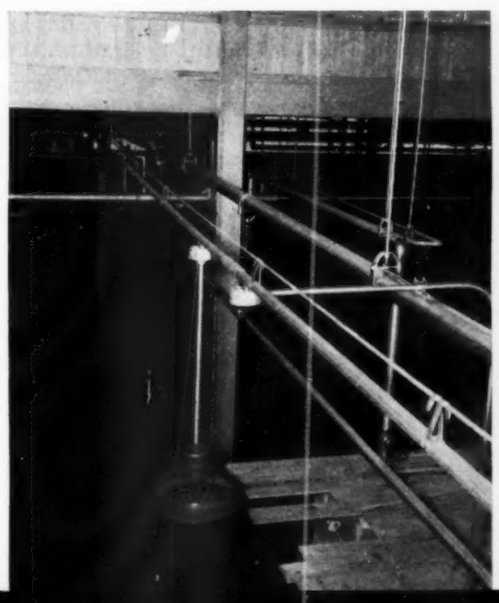
One advantage of using this trapeze type of hangar is the fact that it eliminates the necessity of using duct expansion joints. The expansion and contraction of the building and duct is taken care of by the lateral sway of the trapeze supports in the direction of the duct run.

The problem in mounting the Trol-E-Duct was one of dead ending the messenger cables. Since these runs were parallel to the building width, the cable had to be dead ended in the sides of the building. Ordinarily a through bolt would be mounted in the building brick or steel. However, in this building the glass windows came up to the roof steel at the sides and this method could not be used. Instead, special clamps were designed and fabricated on the job to dead end the messenger cable to the steel roof purlin nearest the side of the building. Where the messenger cable crosses the monitor bays it is supported by long "J" bolts mounted by "C" clamps to the monitor roof steel. U-bolt conduit supports were used as intermediate clamps where the cable crossed steel in the low bay areas. Leveling of the Trol-E-Duct was accomplished by adjusting these supports and taking up on the dead-ending eye bolts. Special messenger cable duct hangers supplied by the manufacturer were used to fasten the duct to the cable.

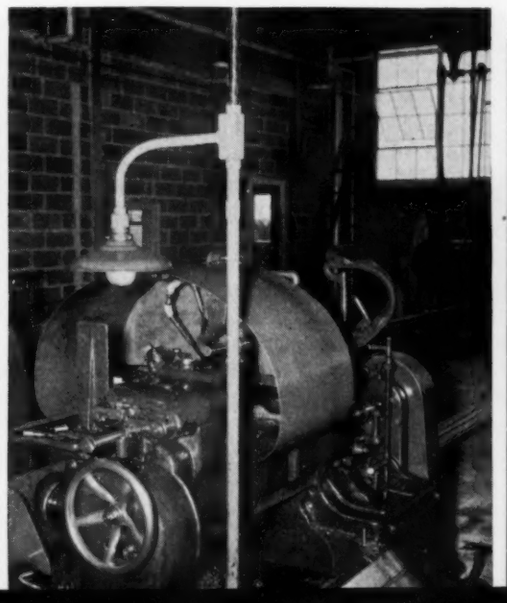
Once the duct supports were fabricated and mounted the installation went along smoothly. All sections of the power duct were delivered to the job clearly marked and identified and cut to fit according to the manufacturer's detailed layout. All the mechanics

[Continued on page 22]

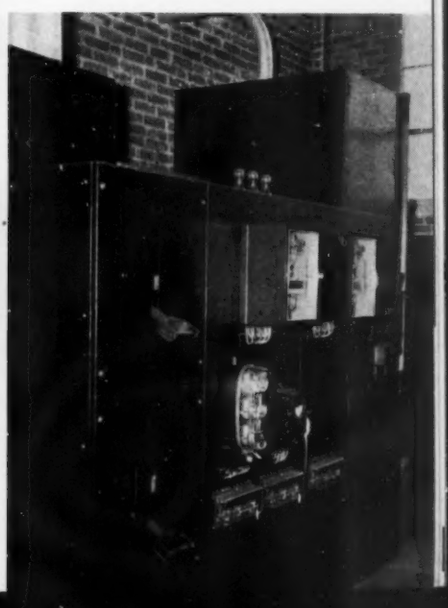
MOBILE FIXTURES. *Complete fixture assembly mounted on a trolley slides along the lighting duct and can be located where desired.*



MACHINE LIGHTS *are mounted on the motor circuit conduit and fed from the outside leg and the neutral of the three phase four-wire system.*



MAIN SWITCHBOARD. *Contains secondary air circuit breakers; utility metering panel; owners' metering panel; and incoming primary breaker.*



Two and One-Half

A brief résumé of what the National Adequate Wiring Bureau has accomplished in its campaign of active promotion work throughout the nation.

THE National Adequate Wiring Bureau launched an educational and promotional program two and one-half years ago. It was designed to increase the wiring standards and electrical adequacy of millions of homes in this country. What success has been achieved? To answer this let's take a look at the record of the Bureau's activity.

Through the cooperation of local industry groups in key centers serving approximately 3,000 cities and towns, the NAWB has been able to (a) carry the A/W message to millions of homeowners through advertising and educational publicity, (b) enlist the active cooperation of hundreds of operative builders and architects, and (c) create a continuing degree of significant "plus" business for contractors and other branches of the electrical industry.

Contributing largely to this achievement were the comprehensive and wholehearted support given the educational activity by all the national women's and home magazines and publications in the building industry and, also the national impetus afforded by the resumption of residential building, its steady increase in the past two years and its continued acceleration at present.

Leading builders and architects are now using adequate wiring in more than 100 major centers. This, in itself, is evidence that the general public is being educated to the importance of adequate wiring as a fundamental in modern home construction. Reports received by the National Bureau and scores of local groups indicate that prospective home owners now are demanding adequate wiring installations.

Other significant developments are: (a) There are now 174 utility companies actively tying-in and promoting residential wiring to approximately 17,600,000 residential customers; (b) The number of cities that have applied for and received licenses to operate the certification plan now totals 38. Ten of these have undertaken this program within the past three months.

The following brief statistical picture shows the vastness of the National Bureau's promotional program which is gaining in momentum and scope each month:

Field Work—Two National Bureau representatives held a total of 686 meetings and conferences in 497 cities in 42 states.

National Magazines—Articles and editorial mention in all of the publications in this category have reached an estimated total of 80,000,000 circulation.

National Newspaper Publicity—National Bureau releases in this field have reached a known total of 60,000,000.

Architectural and Building Publications—National Bureau releases in this field have reached a known total of 2,700,000.

The following reports show the type of activity and the success of the campaign that is taking place in some of the key centers.

1—In Minnesota, a new state-wide certification plan has been developed. This large scale activity is the first to be approved for state-wide operation and is the first in which electrical contractors are playing a leading role. A conservative estimate states that almost 20 per cent of the new homes in Minnesota will have the adequate wiring decalcomania on the entrance cabinet before the end of the year.

The procedure for operating the plan was originally set forth at a series of meetings at which 500 industry members, including some 256 electrical contractors agreed to promote the program.

Here is how it works. Any electrical contractor can register without charge through the Minneapolis office. He receives a copy of the National Standards for Residential Wiring together with a few pages of instructions and information; a supply of applica-

SOME BOOKLETS *and promotional literature released through the National Adequate Wiring Bureau to local industry groups in the national campaign to promote electrical adequacy.*

Years of Progress

tions for A/W certification; samples of promotional literature and two direct-mail campaigns, prepared to help him sell the advantages of an adequately wired home.

When a registered contractor sells an installation which he believes meets or exceeds the approved standard, he sends an application and blueprint to the Minneapolis office together with a fee of $2.00 to cover the certification cost. If approved, the plans are so noted and returned to him together with the outdoor identification poster. If not approved the plans and fee are returned.

A copy of each approved application is sent with the final inspection report to the individual in that area designated to make the A/W inspection on behalf of the North Central Associated Electrical Industries. After the installation is completed and has passed municipal or state requirements, the A/W checkup is made and if it conforms the certificate is issued. Both private and municipal utilities in this area agreed to make the final inspection without cost to the contractor. Where the utilities cannot render this service the State Board of Electricity is cooperating by providing the inspection at a nominal fee.

2—Electrical contractors in one of the divisions of the Washington Water Power Company in the state of Washington, where the certification program is active, are using newspaper space to advertise their congratulations to customers receiving the A/W certificate. The individual contractors pay for the space.

3—A Sacramento, Calif., electrical contractor sells wiring modernization to small residences, especially those for rent, by going to the owner and inviting him to visit some of the new adequately wired homes being built in the neighborhood. He drives home the point that here are new homes that are going to be in competition with the owner's residence in the rental market and that his home must be adequately wired to be on a comparable basis. And it works.

4—Contractors in and around Trenton, N. J., have sponsored consumer meetings at which the sound-slide film "Power for Living" has been shown. Already it has resulted in a number of requests for surveys of home wiring installations with a view to obtaining greater adequacy.

5—The West Penn Power Company's new Sales Training Manual devotes an entire page to the benefits of adequate wiring. The contractor benefits listed are: More profits through additional work and greater volume; good-will through satisfied customers; fewer complaints and a reduction of service calls due to adequate capacity; added profits through the sale of more fixtures and appliances which naturally follow the installation of more outlets and receptacles.

Adequate wiring is much more than just a blueprint showing more outlets—it is "an electrical design for living" and it's up to the contractor to keep this in mind when talking to a customer. Instead of talking No. 10 wire, ¾-inch conduit, or additional cost per outlet, the contractor must speak the customer's language—in terms of what he will receive in the form of personal benefits, comfort, convenience, economy and added safety.

The National Adequate Wiring program is the contractor's program and its success depends in a large measure on the interest and cooperation of the electrical contractor. Being fundamentally in the public interest, adequate wiring has achieved wide success and will achieve even greater success if all contractors will actively promote it. The results of their efforts will be reflected in the increase in their business volume and profits.

PROMOTIONAL LITERATURE *of North Central Associated Electrical Industries is displayed by Charles H. Stephenson.*

When a Customer Is SORE

Seven Suggestions Based on the Experience of Other Business Men.

By Lewis Hudson
Oklahoma City, Okla.

WHAT do you do when a customer gets sore? There is probably no one in the electrical contracting business who hasn't had it happen at one time or another, through some little misunderstanding, and lost a steady customer. Well, here are some suggestions gathered from the combined experience of a score of successful business men that suggest a way to win back these lost lambs.

1. Never make discrediting remarks about the "peeved" customer to any third person. No matter how well we may know this third person, our words sooner or later are bound to reach the ears of the offended individual. So, though this customer may say plenty of unkind things about our business, it is best to remain silent when they are brought to us.

2. We must not go out of our way to avoid meeting the sore customer, nor must we put ourselves in an awkward position by seeking him out too soon. It is best to follow our regular routine as though nothing had occurred until the customer has had time to think things over.

3. After the customer who feels that he has been offended has had time to think the matter over but has not returned to us with his business, it is time to get in touch with him. A good method is to arrange the meeting through a mutual acquaintance whom we know to be a good friend of the customer.

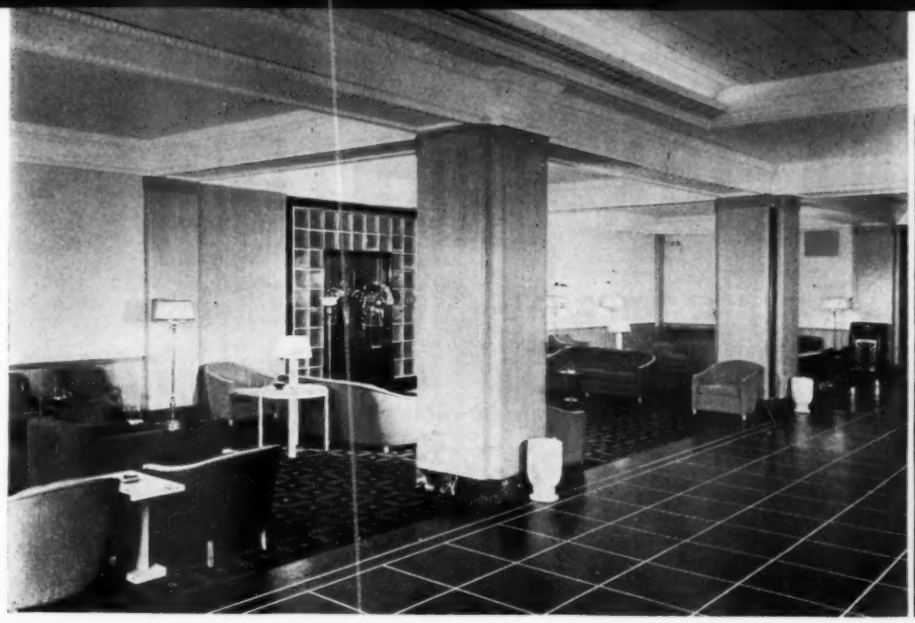
4. If the customer has been doing business with us for a considerable period of time we are generally aware of his habits and know the places he visits. We should then make it a point to visit this place with a mutual friend. Our part at this time is to remain quiet or, at the most, say "Hello!" to the individual. Broaching the subject at this time will serve only to embarrass everyone concerned.

5. After the meeting we depart with the mutual acquaintance and while on the way home drop a hint that we think the former customer is a good fellow and that we'd like to do business with him again. In all probability this friend will tell the former customer in a few days and discuss the misunderstanding with him.

6. Within the next few days we may expect our "peeved" customer to drop back to see us. And unless we are careful he is very apt to leave faster than he came in. If we have been greeting this individual with "Hello, Bill," then we must do so at once. On the other hand, if we haven't been greeting him informally, we must not do so in this instance. But we must make him feel that he has a special place in our business as an old friend. Above all we must not embarrass him with a long apology or say how sorry we were to see him leave us and how glad we are to see him return.

7. After this man has returned for a while as a customer it is a good idea to grant him some extra courtesy or small favor. Since he has been clear minded enough to come back with his business he will recognize the favor and, although he may not mention the fact, it will remain in his mind as a check against any further incident which may arise. It should serve as a reminder that we appreciate him as a customer and a friend.

These seven steps represent a summary of a tried and proven method of obtaining the business of customers that are sore. It may be well, of course, to adjust our plan somewhat to the type of man with whom we are dealing; but in general this seven-step plan can well be used as the basis for our action in every case.



FLUORESCENT COVES *light the lobby. The glass block false window is illuminated by reflectors in back.*

A FREE HAND *to contractor C. O. Heath (right) gave Manager George Papineau (left) a new electrically modernized hotel.*

New Wiring Fills Hotel

Omaha's Castle Hotel is now turning them away because an electrical contractor took some modern ideas and did a good selling job.

"SORRY, we are filled up. We will be glad to help you find accommodations at another hotel"—This may be a headache to the tired traveler, but it is sweet music to the manager's ears, as Manager George Papineau can testify at the Castle Hotel. This is a "Boss" hotel, catering at middle prices to commercial travelers and visitors in Omaha.

The reason is modernization. And electrical modernization was the key to the whole plan. And, behind this modernization job is an electrical contractor.

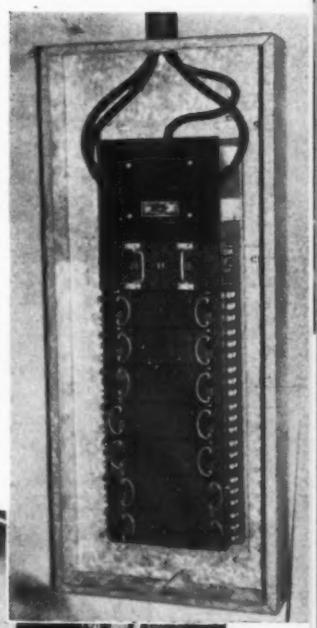
Opposite this 300 room hotel, is the headquarters of the C. O. Heath Electric Co., one of Omaha's leading electrical contractors. When the modernization program was started C. O. Heath was called in. He worked up recommendations on the wiring system and did some good selling and received a free hand to draw plans for electrical modernization throughout. Most of his suggestions were incorporated in the job, by the architects Dougher, Rich and Woodburn.

This modernization job started at the service entrance. Original single phase service entrance equipment was enclosed in a small room in the basement, and was totally inadequate for the load at that time. A new set of entrance equipment was installed including a 400 amp. 500 volt d.c. service for the elevators and a 1,200 amp. 3 phase 4 wire service for lighting, power and air conditioning. A new dead front switchboard was furnished and all panelboards throughout the building were changed to modern dead front types. Existing feeder conduits were used where possible by cutting areas served by each feeder and installing new feeders for the areas cut off.

Additional capacity of 100 hp. was installed for air conditioning and a 250,000 cm circuit run in for an all electric restaurant. Branch circuits were split and new home runs installed to increase capacity and minimize voltage drop.

In each room, old lighting equipment was removed and modern semi-indirect fixtures substituted, with modern styled IES desk and bridge lamps added. Baths were equipped with porcelain brackets switched at the door. And in the lobby and public spaces fluorescent cove lighting and floor lamps now provide soft, attractive lighting.

Manager Papineau has been studying electrical modernization and worked out some ideas of his own. He is now carrying the gospel of electrical modernization to regional hotel conventions in the Middle West.



KITCHEN PANEL *gives a good example of the modern equipment installed to replace the obsolete wiring devices.*

MAIN DISTRIBUTION *replaces old open switchboard. The end cabinet encloses current transformers for submetering for interval cost accounting.*

COMBINATION LIGHTING

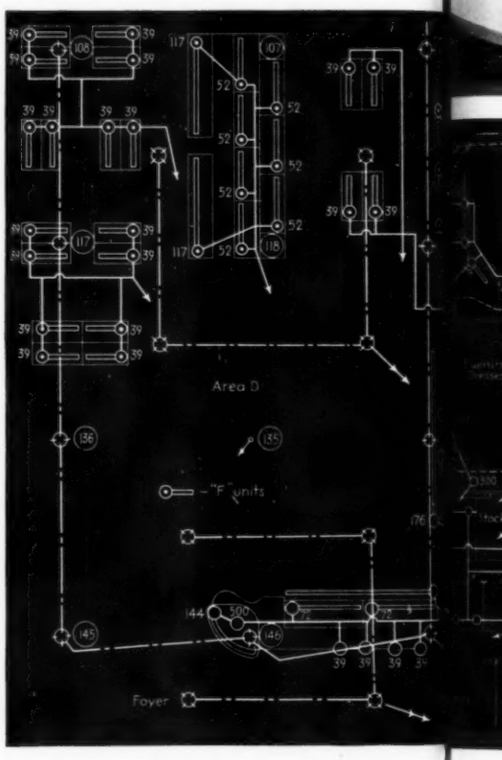
in a Department Store

Fourth in a series of articles on the design, application and installation of fluorescent lighting. Relighting a large department store, a St. Louis contractor effectively combined incandescent and fluorescent lighting.

AMONG the earlier fluorescent lighting jobs, lighting system designers were inclined to apply an arbitrary all "or none" principle. Placed side by side, daylight fluorescent luminaires and enclosing globe type of incandescent lighting fixtures made the fluorescent units look too blue and the incandescent unit a dull yellow. Thus, lighting design was limited to the use of all fluorescent lighting or all incandescent lighting.

This stringent limitation is no longer necessary and there are many examples now of effective and attractive lighting installations using both fluorescent and incandescent sources in complete harmony. The white fluorescent lamp which provides a light source that more closely approaches familiar interior lighting color quality, improved fixtures which conceal the lamps and careful layout to avoid direct comparisons between lamps have all helped to bring about lighting installations which employ the best characteristics of both types of light sources.

An excellent example of combination lighting has been recently installed in the third floor of the Stix Baer & Fuller Department Store in St. Louis, Missouri by the S. C. Sachs Company, electrical contractors. The entire floor is devoted to women's wear and the lighting installation was made as a part of the modernization of the department.



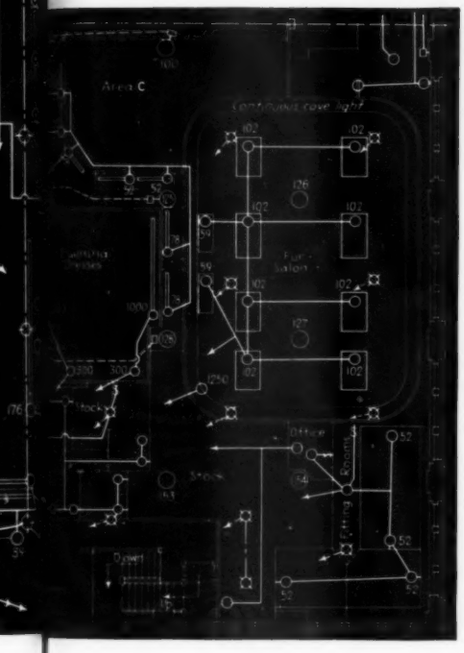
Lighting treatment involves flush and semi-flush mounted incandescent lighting units for general illumination and fluorescent lighting for display, showcase illumination and decorative treatment. The lighting system is designed to provide 20 to 25 foot-candles of general illumination with supplementary display lighting of 40 to 60 foot-candles.

The floor area, 225 by 150-ft., is served by eight panelboards totaling 300 branch circuits, 245 active and 55 spares. The total incandescent lighting load is 103,200 watts; fluorescent strip and case lighting, 45,699 volt-amperes and fluorescent fixtures, 1,467 volt-amperes. The total connected load, including plug receptacles, is 186,900 volt-amperes.

LIGHTING DESIGN TABLE

Panel	Ceiling lights	Watts ea.	Total watts	Flight strip-ft.	Total V.A.-60%	Fluor fixtures	Total V.A.-90%	Recep-tacles	Total outlets	Total V.A.	Circuits in panel
A	11	300	3300	57	5000	10	560	32	127	23000	35
	17	500	8500					5800w			5 sp.
	12 cir.		11800	6 cir.		1 cir.		16 cir.			40
B	17	500	8500	5	787			19	41	12700	20
								3400w			4 sp.
	9 cir.			1 cir.				10 cir.			24
C	16	500	8000	58	7112	8	907	4	95	18800	20
	9	300	2100					720w			4 sp.
	11 cir.		10100	6 cir.		1 cir.		2 cir.			24
D	34	500	17000	99	10500			40	180	36800	49
	7	300	2100					7200w			11 sp.
	19 cir.		19100	10 cir.				20 cir.			60
E	28	500	14000	103	11000			38	180	35100	48
	11	300	3300					6800w			12 sp.
	18 cir.		17300	11 cir.				19 cir.			60
F	32	500	16000	84	7600			8	138	29200	34
	14	300	4200					1430w			6 sp.
	21 cir.		20200	9 cir.				4 cir.			40
G	30	500	15000	37	3700			19	90	23300	31
	4	300	1200					3400w			9 sp.
	17 cir.		16200	4 cir.				10 cir.			40
H									60	8000	8
											4 sp.
											12
Total	230		103200	443	45699	18	1467			186900	

A COMBINATION *of fluorescent show case lights, recessed luminaires and cove lighting shows women's apparel and accessories at their best in this department store.*



FLUORESCENT SHOW-CASE *lighting is combined with incandescent general lighting in this partial layout at the elevator foyer. (Diagram page 16.)*

FURS AND EVENING *gowns are brilliantly displayed under fluorescent case lighting, cove lighting and high intensity incandescent units. (Diagram at left.)*

Two portions of the layout are shown in the accompanying drawings: Area D illustrates layout employing direct lensed units on approximately 18-foot centers, indirect units at the columns and fluorescent case lights. A display platform is illuminated by a 500-watt fresnalite unit.

In area C are two examples of special lighting treatment. Wall cases are illuminated by fluorescent units. General illumination is provided by continuous fluorescent coves along two sides of the room. Two 300-watt lensed incandescent units project light downward at one end of the room for model displays.

Fur displays are at their best under fluorescent lighting and in the fur salon all of the lighting is provided by fluorescent units. Individual strips illuminate the recessed racks, flush recessed units in the ceiling provide general down lighting and a continuous fluorescent cove illuminates the side walls and ceilings.

Walter Coryell, engineer for the electrical contractor offers the following suggestions for laying out and installing combination fluorescent and incandescent lighting jobs.

1. Conceal all lamps from direct view. The difference in color quality between fluorescent lamps and incandescent lamps is accentuated if the light source can be seen.

2. Avoid direct comparison between light sources. For example, two show cases side by side, one illuminated by fluorescent lighting and the other by incandescent lighting, permit direct comparison of the color quality of the light. However, concealed fluorescent case lighting in the presence of relatively high intensity general lighting from incandescent sources harmonize effectively.

3. Use full voltage on incandescent lamps and use white fluorescent lamps. Much of the apparent dullness of incandescent lighting in the presence of fluorescent lighting is due as much to excessive voltage loss on the wiring system, and consequent lamp undervoltage, as to the inherent color characteristics of the incandescent lamp. The white fluorescent lamp also offers a closer approximation of incandescent light quality than the daylight lamp.

4. Use high illumination intensities. Higher general lighting intensities from incandescent sources reduces the apparent color contrast.

YOUR FIRE INSURANCE...

Be sure you have adequate fire insurance protection and always read and understand every insurance policy. Here are some points to watch.

By Arthur Roberts

An independent auditor and accountant who is specializing in service to electrical contractors

INSURANCE is bought to protect the policyholder against certain specific hazards—fire, accident, and so on. When policy conditions and common legal requirements are met, there is usually no difficulty in collecting in full. But sometimes a seemingly trivial detail can void a policy, or make it give only partial protection. This matter of insurance is vital to electrical contractors because they face a diverse list of hazards both in their shops and on their jobs. A clear understanding of just what they are doing when they buy insurance is essential.

Let us see how this works out in the case of fire insurance, which every business man carries. Assuming that the contractor has read his policy—and it's surprising how many men never do read a policy—there should be no question that it will give the required protection. Yet an analysis of our records for many years past shows five basic reasons why contractors are not adequately protected, or are paying too much for their protection.

1. Under-Insurance

Serious losses can be sustained by carrying too little insurance. Failure to carry enough insurance makes the contractor a co-insurer—a term misunderstood by many. Fire insurance premiums are generally based upon the assumption that all policyholders will carry a definite percentage of insurance against total value, usually 80 per cent. If a contractor does not meet this requirement, he becomes a co-insurer; that is, he insures himself for the amount he is short.

For example, one contractor carried $30,000 insurance on property worth $50,000. A fire caused a $25,000 loss. Being insured for $30,000, he expected to collect the full $25,000. But because he had not insured for the required 80 per cent, the co-insurer clause became effective and he collected only $18,750 or three-fourths of $25,000 because he had insured for only three-fourths of $40,000, the necessary 80 per cent of actual property value. Had he carried $40,000 insurance he would have collected in full for any loss up to that amount.

2. Over-Insurance

Fire insurance is intended to reimburse the assured for real losses only. He has nothing to gain by overinsuring. The amount of protection must be based upon actual *replacement* value at the time a fire occurs. That means that an old building should be insured for enough to build a new one like it, less accumulated depreciation on the destroyed property. To insure for more than "present value" is sheer waste. Despite the over-payment of premiums, present value is all they can collect after a fire.

3. Check Policy Provisions

It is not enough to read your policies when you first get them. Look them over again every time you make changes in or around the property. Repairs and alterations may make the risk more hazardous than when the policy was written. Some policies do not provide coverage if alterations take more than 15 days, unless you get written permission from the insurer. If alterations do not conform to policy conditions, get coverage by paying additional premiums, or by getting written permission if there is no extra premium charge. If you keep inflammables on the premises, be sure the policy permits such storage. If a building is partly frame and partly brick, be sure this is stipulated in the policy. If you don't, you may not be able to collect on losses. Be sure also that any changes in ownership or assets are reflected properly, and that inventories are adequately covered.

4. Fire Hazards

Elimination of hazards will lower your premiums. The installation of preventive equipment, or the making of structural changes, will sometimes save real money. In one typical case, a policy holder cut insurance cost $125 a year by protecting the floorway opening from the basement to the first floor, installing fire extinguishers and fire shutters, cleaning rubbish out of the basement and using approved containers for storing and handling inflammable liquids. Look your property over for possible hazards, then talk with your insurance consultant about ways and means of eliminating them to your own profit.

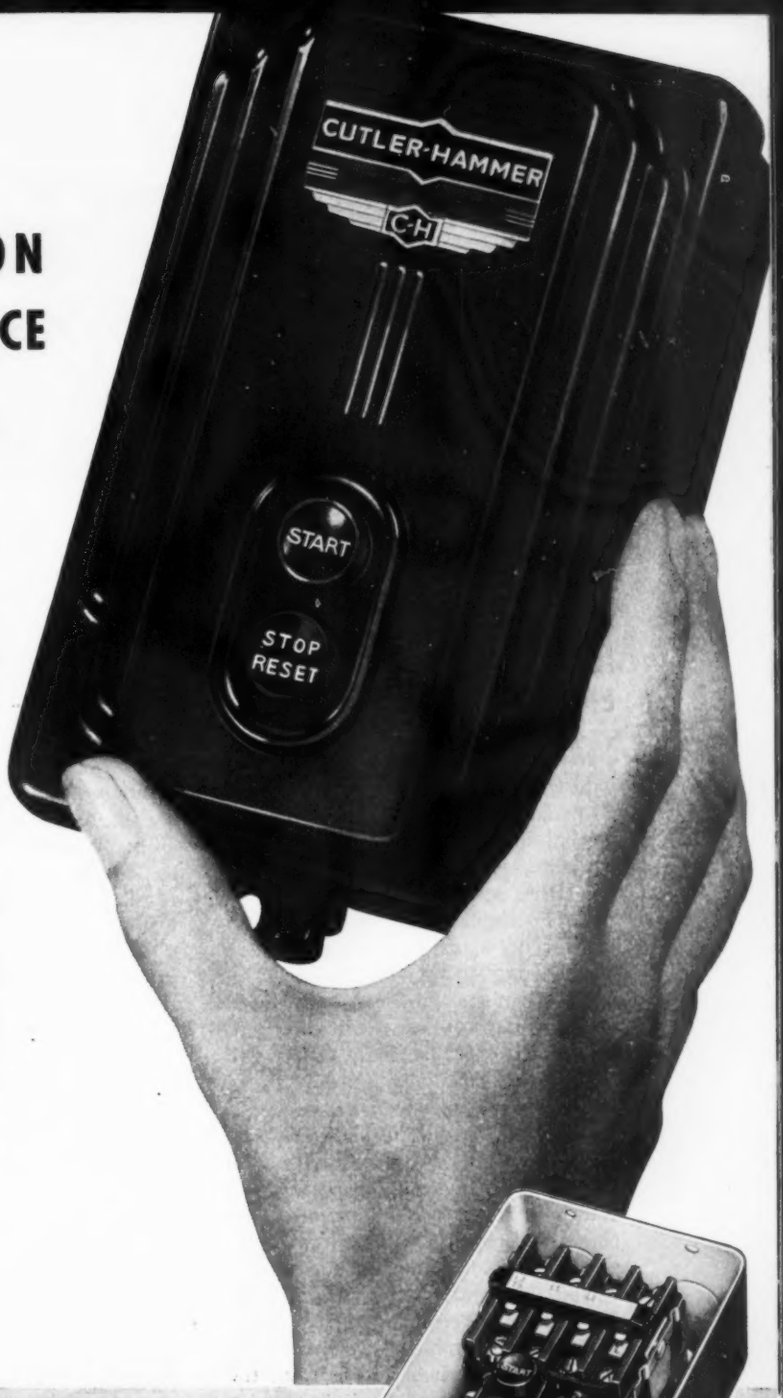
5. Pig-in-poke Insurance Buying

Insurance is too important to be bought haphazardly. Yet many policies are relatively ineffective because the insurer didn't know what he wanted, or left it to some friend in the insurance business who knew still less what the insurer wanted. Trying to satisfy several friends by giving each a slice of your insurance is one common way of getting a bad final result. This may result in overlapping coverage between two policies, which means paying twice for the same thing. We have found cases of too much insurance on one building, too little on another, too little on the stock and too much on equipment and fixtures. In such a case the contractor is paying for enough insurance but has only about a 50/50 chance of collecting in full if a loss occurs.

Sound insurance buying means first of all that you know exactly what you want to insure, and for how much. Then you, or your consultant, should be sure that policies actually give you coverage, that you are meeting all conditions, that policies are properly signed and dated. You should determine whether your fire policies are eligible for supplemental endorsement, covering losses from tornado, hail, falling trees, explosion, riot, aircraft and motor vehicle property damage, etc. Sometimes these features can be bought for a slight extra premium, thus eliminating the carrying of separate policies at greater expense. It is only through thoroughness like this that you can be sure that you are not wasting your insurance money, and that you are getting every dollar of protection you need.

Tops!

1ST in PROTECTION
1ST in PERFORMANCE



The New C-H Size "O" Motor Control With Dust-Safe VERTICAL Contacts For Motors up to 2 H. P.

Since its introduction, this new Cutler-Hammer Size "O" Automatic Magnetic Starter has been the outstanding choice of discriminating buyers of Motor Control. This is not Motor Control cut down in size but an entirely new small unit engineered from the ground up to provide the dependable "start-stop-protect" features for which Cutler-Hammer Motor Control is famous. It's *NEW* throughout... from air-styled enclosing case to mounting screw... from the high-efficiency, long-life contact structure to the exclusive long-life vacuum-impregnated magnet coil... from VERTICAL Dust-Safe Contacts to the never-paralleled "Drop of Solder" Eutectic Alloy Overload Relay. For the maximum in starter performance, life, accessibility and trouble-free operation, you'll specify the New C-H Size "O" Starter the next time you buy.CUTLER-HAMMER, Inc., *Pioneer Electrical Manufacturers,* 1306 St. Paul Avenue, Milwaukee, Wisconsin.

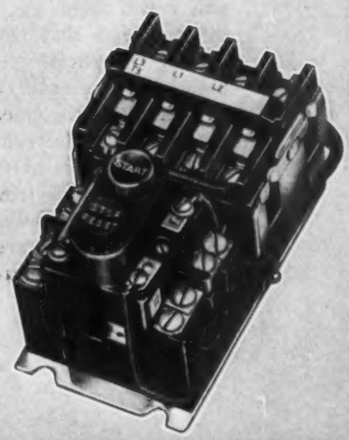
CUTLER-HAMMER
MOTOR CONTROL
C-H

Standard Features of C-H Bulletin 9586, Size "O" Pushbutton Magnetic Motor Control

1. Vertical "dust-safe" twin-break silver-to-silver contacts 99.99% "fine" reduce arcing, prolong life.
2. Vacuum-impregnated, Tung-oil magnet coil, solid, 100% filled for longer life and superior performance.
3. Pivoted construction of magnetic contactor and self-aligning armature eliminates sliding friction, provides equalized contact pressure and quiet operation.
4. Free-tripping, non-closable on overload, tamper-proof Thermal overload protection embodying the famous C-H "Drop of Solder." Overload trip indication. Reset from front of case. Nothing to replace after overload. Relay interchangeable for all h.p.'s by changing heater coils.
5. Mechanism mounted on common base plate, supported on soft rubber bushings. Removed by loosening one screw.
6. Enclosed starter has "light" interior, hook-on cover and provision for padlocking.
7. Open type controllers available for built-in applications.
8. Pushbutton operation from front of cover. Other standard forms of control available.

Vertical Contacts Safe from "Demon Dust"

Dust between contacts causes heating and burning. *But dust can't settle on Vertical Contacts!* C-H Contacts are *always* vertical, hence *out* in the open, *air-cooled,* fully accessible.



Earl Whitehorne, Editor

Industrial Electrification

In the next few months American industry faces the three fold task of re-arming America, acting as an arsenal for the Allies, and supplying the huge appetite of the public for the necessities and luxuries of life.

To accomplish this task, industry must rely upon electricity. Plants that have gotten by with antique lighting so long as they ran only eight hours a day will now need modern illumination so that night shifts will produce as efficiently as day shifts. Old wiring systems must be overhauled and made adequate, for no factory can take a chance that wiring or controls or motors will break down and halt top-speed production. New plants will require both modern equipment and rapid erection.

Both electrical contractors and industrial chief electricians are faced with critical problems in helping to speed up our industrial life from the torpor of depression to 1000-plane a day tension. To meet those problems they will need every bit of information they can get about product application and installation, and about smoothly-functioning maintenance.

To serve this need, our Maintenance Section is now expanded and given a new name—Industrial Electrification and Maintenance. In this section we will run a series of articles covering the problems that must be solved in making industrial electrical systems, both large and small, operate with the efficiency that the emergency demands. In addition, feature articles will provide case studies of the most modern applications of electrification in industry. In this way, we hope to play a worthwhile part in preparing America for anything the future may bring.

Regard the Mover

We wanted to ship some furniture a hundred miles out of the country—so we asked a mover for a price. Pretty high, we thought, so we asked some other movers—and got the same result. *Approximate* prices — we would actually pay by the hour. And the smallest guy wanted the same price as the largest.

There's something for you. There must be more truckers and movers in New York State than there are electrical contractors. Yet they were all living up to a set price structure. Furthermore, some mover was going to make a clear profit, whether it took one hour or twenty. And those movers were right. They were in business to do a service and were entitled to a profit.

Out of this experience arises a question. Isn't it about time we started selling our services and our knowledge, so we can get more jobs on a cost-plus or fee basis?

Skepticism

There are still many in our industry who are skeptical about recommending the use of the new small diameter building wire to solve their customer's overload conditions. This, in spite of the fact that many inspection authorities are giving special permission for its use, until the new 1940 Code is published. This skepticism may also be due to an inherent hesitancy to use anything that is new and apparently untried by time.

However, we don't wait until 1942 to buy a 1940 car. Furthermore, the testing laboratories of reputable manufacturers today can duplicate any operating conditions which may exist and any conditions which may arise to abuse an electrical system. When a product passes these tests you can be reasonably sure that it will stand up. And so it is with this new thin wall insulated wire.

Contractors who hesitate to use it, or argue against its use will soon find themselves behind the eight ball. For, if they don't install it in the overloaded buildings some other contractor will. And a nice bit of business will go by the boards for which these contractors will be sorry later on.

Let's not stand in the way of progress and deliberate over a product which has been tested and approved and which will be sanctioned in the new Code. There's plenty of new business to be had in the rewiring field and God knows we can use it.

And We Encourage It

Now most businessmen don't deliberately sell something for less than it costs them. Usually a contractor has a pretty fair idea of what his labor is going to cost. So if he bids on a job at less than his cost of labor and material it's a cinch that he expects to finish the job with a lower material cost than his estimate shows.

But he knows that once he gets the job all he has to do is sit in his office and listen to the sweet music which manufacturers and suppliers make when they underbid each other.

The one thing about this we don't understand is why manufacturers let their price structures weaken. Every competent manufacturer knows his costs accurately; he knows that his costs and his competitors' costs are so nearly alike as to be practically identical. His regular catalogued prices, less standard discounts, aren't exorbitant. Why give the stuff away?

More On ReWiring

July trade paper advertisements are announcing the start of label service beginning July first for type RU small diameter building wire.

While rapid strides have been taken in many localities to open the rewiring market with local inspectors' approvals, it is most important to realize that this could only be a temporary method.

The regular machinery of our industry is not based upon temporary approvals, but upon a widely accepted Code plus approved products. It is therefore welcome news that rewiring is getting onto a permanent basis that will mean broader marketing opportunities for all.

The Penalty of Speed

Speed is the keynote of our National Re-armament program. Hundreds of new plants must be built. Other thousands must be modernized.

Unfortunately, speed in the preparation of plans and specifications may mean serious errors and omissions. It would seem to be the clear duty of our readers to try to catch these errors before submitting prices—for otherwise there will be arguments and delays after jobs start. Contractors may even find themselves forced to make good the mistakes of others.

Another thing—where speed is vital penalty clauses are common. Many of these new plants will require specialized equipment which manufacturers may have trouble producing in a hurry—due to the serious lack of skilled workmen. There is only one safe course—check up carefully on reasonable delivery dates even on more or less standard equipment. If deliveries seem likely to be slow the time to say so is before the contract is signed.

This is written in the belief that by ironing out potential difficulties before jobs are started our industry will be better able to play its part—and it's an important one—in the months to come.

Built-in Home Lighting

Those capped living room ceiling outlets mean a serious cut in residential fixture contracts if we don't do anything more about them than quietly sob in our beards. First of all, we can do a real selling job on the advantages of ceiling and wall fixtures—both from the "better sight" and "better decoration" angles.

Secondly, there are some swell specialized methods of lighting that have a lot of sales appeal to the prospective home owner. In-built lighting can turn the trick. Flush lighting in bookcases, mantel top and mirror frames accents modern construction. Flush pin spots over the dining room table, lens units over the kitchen sink, louvered night lights in hall baseboard, will take up the slack in the fixture contract and maybe add a few dollars. And if those extra dollars happen to come out of the landscape contract or the plastering contract we can't cry—for we know that every dollar added to the electrical contract means greater utility, safety and comfort in the finished home.

Overload Warning

Where motors operate key machines in an interlocked industrial process, plant men are sometimes more concerned with the continuity of the process than with overload protection for the motor winding. They feel that, figured in dollars and cents, it is cheaper to risk a burned out motor than to interrupt the operation.

Eliminating or shorting out the protective relays avoids a shut-down up to the point where the motor burns out. But a better plan, that affords some protection to the process, is the use of a gong or siren actuated by the protective relay circuit.

While the machine continues to run under a dangerous overload, the signal gives the operator a chance to reduce the load or have the maintenance crew ready with a new motor.

Back Talk

Any Tool Casualties

To the Editor—"After reading the editorial 'Any Tool Casualties', I thought I would make a suggestion as we have considerable trouble with portable tools in this locality. There is no inspection here and naturally some pretty shoddy electrical work.

"I have often wondered why the Code did not make some provisions to protect users of portable appliances. My idea is to prohibit the use of two wire plugs and receptacles. Insist on all appliances having a three wire cord with a ground connection in the receptacle. Where a grounded neutral is used appliances could be built the same as automobile starters and generators and use a polarized plug. Either of these methods would ball things up until all appliances complied with the new setup. Something must be done about this in the near future."

Chris Duerr,
Del Norte, Colorado.

The Code, under 2518c, does recommend the grounding of all portable equipment, and there will be a provision in the new Code, Section 2545c. So far, this has been applied mostly to portable tools. Perhaps we have all been a little weak in not pushing this same idea for appliances too.

Kind Words

To the Editor—"I thank you very much for the *Electrical Buyers Reference* I received some time ago. It is complete, compact and simple to use. It is one of the most useful books I have.

"I think *Electrical Contracting* is the best paper I have ever taken; it covers so much in the electrical field. I like the whole paper and read it from cover to cover but most of all the motor repair shop, maintenance and Code sections are of interest to me."

Emmett J. Germain
Athol, New York

Thank you Mr. Germain. It helps a lot to know that you are finding this magazine and the Buyers Reference *useful to you. It was good of you to write and say so.*

Cooperation

To the Editor—"Kindly send us two hundred copies of the editorial 'Bare Handed'. We think this is an excellent article and we plan to send a copy to each of the electrical contractors in the city of New Orleans."

E. N. Avegno, Manager
Dealer Sales Division
New Orleans Public Service, Inc.

We feel that all contractors should be interested in this and we are glad to know that you are going to send it out.

Bare Handed

To the Editor—"I am glad to take this opportunity to congratulate you upon your editorial 'Bare Handed' in the May issue. This is the kind of constructive effort most needed by contractors, and is exactly along the lines of what we have recognized in this area for many years past. Furthermore, we have done something about it.

"Under the sponsorship of the North Central Associated Electrical Industry, an all-industry group, and the direction of William Ritt, the contractor group has progressed further along the lines of your editorial than I think any other similar group in the country.

"We have sponsored meetings of contractors continuously throughout this area, and have built up an attendance at these meetings and an interest in the welfare of the contractors which is truly unusual.

"The Adequate Wiring Program has offered a still further opportunity to place before contractors plans and ideas for them to use to their advantage. Their group has set up a complete certified Adequate Wiring Program for this area. Ten meetings of contractors have been held so far in this State, and five more are still to be held.

"It is estimated that the contractors and contractor dealers in Minnesota will do a business of $10,000,000 this year."

H. E. Young, Vice-President
Northern States Power Company
Minneapolis, Minn.

We are glad to know that you are working along these lines in your territory and the North Central Associated Electrical Industry's educational program is splendid. The Minnesota State Plan is a fine example of what can be accomplished in the Adequate Wiring campaign. Keep up the good work.

RUBBER COVERED POWER CABLES • BUILDING WIRE

CRESCENT

VARNISHED CAMBRIC • FLEXIBLE CORDS • LEAD ENCASED AND PARKWAY CABLES • ARMORED CABLE

CRESFLEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • MAGNET WIRE • BARE WIRE

Small Diameter Building Wires

Offer Big Opportunity to Cash In on the Need for Rewiring . . . . .

88% Obsolete

95% Obsolete

95% Obsolete

98% Obsolete

87% Obsolete

75% Obsolete

A nationwide survey (reported in the May issue of Wholesaler's Salesman) clearly shows the number of electrically obsolete buildings in the country. We give you here a few outstanding examples. You can be sure that all the rest—apartment buildings, factories, other types of commercial properties, hospitals and other institutions—are in a similar state of electrical obsolescence.

CRESCENT SMALL DIAMETER BUILDING WIRE, in both Types SN Synthetic Insulated and RHT Rubber Insulated, is your answer to this urgent need for rewiring—a tremendously profitable market waiting for you to crack open. Write direct to us or your nearest CRESCENT representative for full information as to sizes available, current carrying capacities and the advantages of rewiring with CRESCENT SMALL DIAMETER BUILDING WIRE.

CRESCENT
INSULATED WIRE & CABLE CO. INC.
TRENTON, NEW JERSEY

Atlanta Baltimore Boston Buffalo Chicago Cincinnati Cleveland
Detroit Indianapolis Kansas City Los Angeles Minneapolis
New Orleans New York Philadelphia Pittsburgh St. Louis San Francisco

CRESCENT ENDURITE SUPER • AGING INSULATION

Designed for Flexibility

[FROM PAGE 11]

had to do was to lay out the duct on the floor according to the plans, mount it and bolt the buses and casing together at their junctions. The fusible power taps were all wired at the field assembly bench. Wire of sufficient length to reach the machine starting equipment was left coiled up and tagged. Each tag indicated the size and length of the wire, size of the fuse and number of the machine it was to serve. It took only a few minutes to mount the power tap on the duct and then all was ready for the machine to be set.

Lighting fixtures were systematically wired and assembled at the assembly bench. First, all the trolleys were wired; then they were mounted to the outlet boxes and the canopy switches installed; then the fixture canopies were wired and the conduit stems assembled complete with aligners; next the trolley-mounted outlet box was connected to the canopy wire and the aligning cover mounted to the outlet and the fixture was ready to be inserted in the duct.

Cooperation Maintains Schedule

When the machines arrived from the old plant they were set and temporarily connected immediately so that production could be started. While the machine was in operation, the electrician installed the conduit from the motor starter to the power tap and during the noon hour shut down he pulled the temporary wires into the conduit and made the permanent connection. This was all in accordance with the owners' schedule of a six-hour shutdown per machine which included disconnecting it at the old plant, loading it on a truck, transporting it five miles to the new plant, unloading and setting it and connecting it for production. Through the cooperation of the plant engineering staff, the riggers and the electrical contractor this schedule was maintained and the entire plant was moved in one month, with production being maintained at each plant at the same time.

With many industrials intently studying production problems connected with the re-armament program, systems of this type provide one method of getting unusual flexibility, and enabling quick changes in layout and a high degree of salvability. It solved the problem of this typical manufacturing plant and the close cooperation between the contractors and owners made possible the relocation of an entire plant without a serious disorganization of production.

Curtis SKYLUX SYSTEM

(PATENTS APPLIED FOR)

is leading the advance in the new fluorescent lighting era

TWIN SKYLUX LUMINAIRE

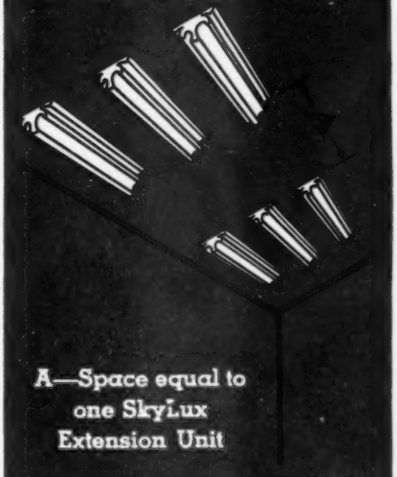
TWO SECTIONS SHOWN HERE
COUPLED TOGETHER

1. "FLURACITE" REFLECTOR
2. LAMP SHIELD
3. FLUORESCENT LAMP (not supplied)

SINGLE ENTRANCE

TODAY

Supply to your customers new high quality Fluorescent illumination with SkyLux luminaires accurately spaced at correct intervals to permit . . . . . .



A—Space equal to one SkyLux Extension Unit

SkyLux wiring system is designed to save the Contractor time and money.

Wires brought into one section can be lead through the entire run. SkyLux comes in 4′ sections which can be used as individual luminaires or coupled together into continuous runs.

Please write for complete information. Serial No. 1040.

CURTIS LIGHTING, INC.

1123 W. JACKSON BLVD.
CHICAGO
NEW YORK TORONTO

TOMORROW

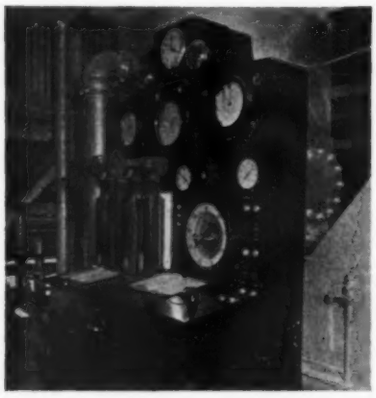
Increasing intensity by adding more stock SkyLux units and coupling sections together into continuous lines of high-intensity, low-brightness light.

B—Newly installed SkyLux Extension Units

WIRING Methods

ILLUMINATED GAUGE PANEL

Quick and accurate readings of fluid gauges are made possible by an illuminated glass panel built into the instrument



ILLUMINATED PANEL facilitates accurate readings of fluid gauges on this instrument board.

and control board at the West Vaco Chlorine Products Co. plant at Newark, California.

Removable sections on front, side and rear give access to control and instrument wiring. Slanting top to cabinet provides convenient desk space for entering data in record books. The entire panel was fabricated and assembled on the job site by the Pacific Electric Motor Company of Oakland, California.

LOCATING DEAD ENDED CEILING CONDUITS

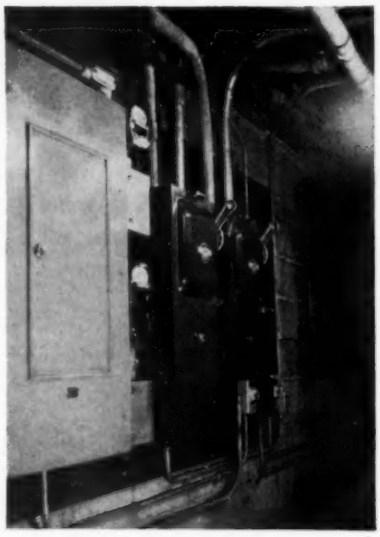
L. W. Kiesewetter, electrical contractor of Syracuse, N. Y., was recently called in to locate a number of conduits which failed to enter outlet boxes. They ended somewhere between outlets. The conduits were concealed in a plaster ceiling and it was this contractor's job to locate them and extend them to the outlets.

He used compressed air and water to locate them without chiseling out too much of the ceiling. A water filled container with an air hose connection on one end and a nozzle on the other was used to force water into the open end of the conduits. The water was left in the conduit over night and the next day a telltale damp spot on the ceiling plaster indicated the dead end. The plaster was chased from this spot to the outlet and a conduit extension installed.

After the extensions were completed the conduits were swabbed and compressed air again used to dry them out. This method was used at about 50 points in the building.

PLYWOOD METER BOARD

Rodney Albright, electrical contractor of Coldwater, Michigan, uses a plywood meter board as standard in all his installations. The board shown in



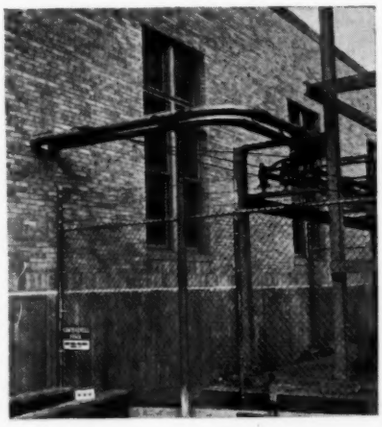
PLYWOOD PANEL is used as a meter board on which to mount the entrance equipment, meters and distribution panels in this installation.

the photo is ¾-inch plywood, stained and varnished on both sides. It is mounted to the cement block wall by ½- by 6-inch toggle bolts.

The equipment on the board is the entrance service of the MotorCar Transport Company and includes a 100-ampere, 440-volt, three phase power service which can easily and inexpensively be changed to a 400-ampere size in the future. The other is a 400-ampere, single phase, 110/220 volt lighting service. Entrance switches, meters and distribution panels are mounted on the same board to make a compact installation.

OPEN OVERHEAD CONDUIT SUPPORT

Two 4½-in. service conduits were extended from the super-structure of an outdoor sub-station into an adjoining building at the new Public Market in Kansas City, Kansas. The run, about 15-ft. above the ground, involves a 90



T POST supports service conduits between sub-station structure and building.

deg. turn at a point where it could not be supported from the sub-station structure or the building. W. T. Foley Electric Co. of Kansas City, Kansas, the electrical contractor, erected a 2½-in. post at the fence line. A 2-in. nipple forming a T at the top of the post gives neat and effective conduit support.

COUNTER-WEIGHT FIXTURE MOUNTING

An adjustable mounting for a fluorescent fixture over an estimating or any other type of table has been designed and installed by George J. Martin & Son in their Albany, N. Y., office. A 48-inch two-lamp reflector is ceiling suspended by two counter-weighted chains operating on pulleys mounted to the ceiling.

The counter-weights are made of 2-inch conduit, lead filled and of proper weight to counter-balance the fixture. The fixture remains in any position desired and permits easy raising and low-

GOD IS ON THE SIDE OF THE HEAVIEST ARTILLERY — AND THE STRONGEST INDUSTRIES!

We reprint this advertisement which first appeared in September, 1938, as an example of our early desire to promote the defense of America.

A NATION'S INDUSTRIES ARE ITS THIRD LINE OF DEFENSE

Armies without a constant stream of supplies are helpless in the field. Navies without material for repairs or munitions are tied to our shores. War today is a war of materials.

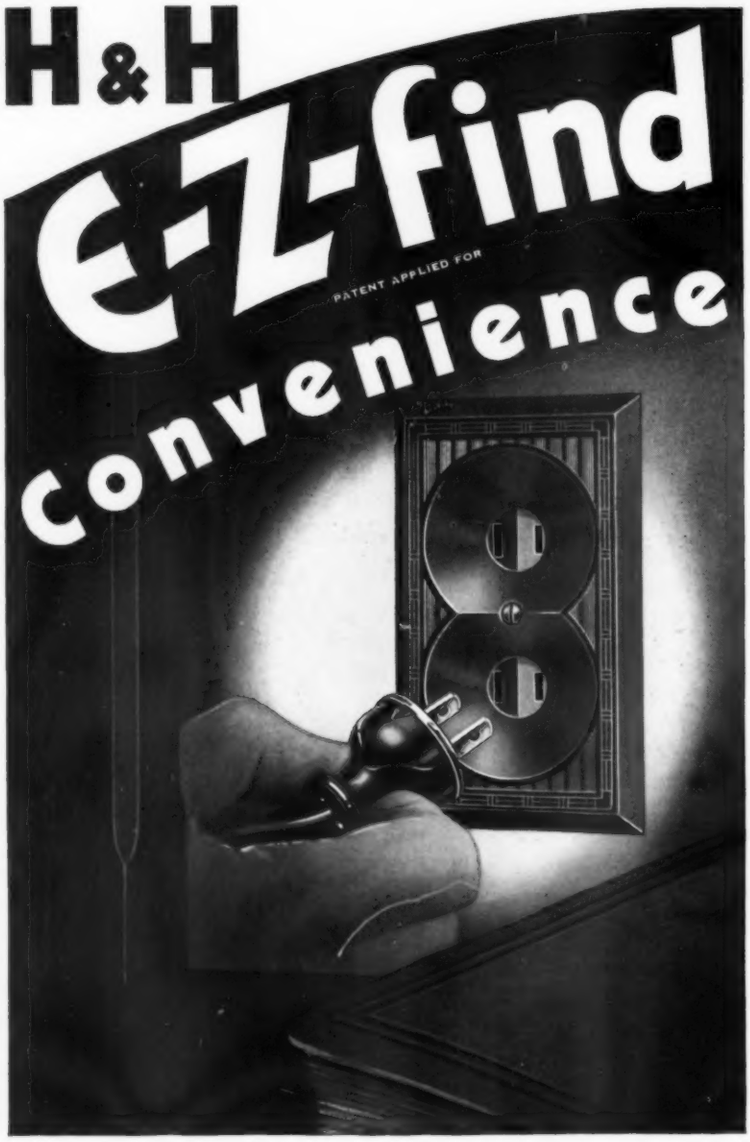
Modern wars are waged behind the lines, in the nation's factories. Modern war technique strives to destroy the source of munitions.

When the stream of war supplies is choked off, armies and navies are helpless. Legislation that prevents industrial expansion would affect our defense. Let us protect and encourage our industries to expand now, in time of peace, so that in a time of national emergency they will efficiently provide the sinews of war for our armed forces. The Okonite Co., Passaic, N. J., offices in principal cities.

OKONITE

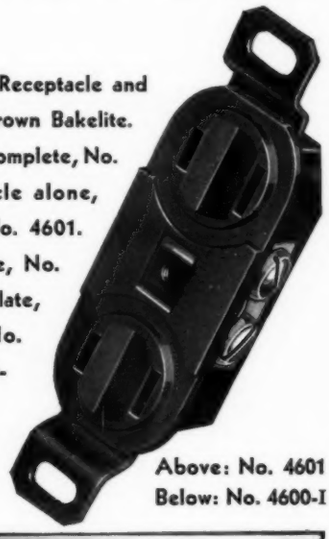
INSULATED WIRES & CABLES

H&H E-Z-find Convenience Duplex Outlets



Behind tables, lamps, davenports — in dark corners anywhere — as easy to use as if spotlighted! The plug blades slide into the center from any point on the curved surfaces of the plate.

At left: No. 4600 Receptacle and plate complete; brown Bakelite. Same in Ivorylite, complete, No. 4600-I. Receptacle alone, brown Bakelite, No. 4601. Same in Ivorylite, No. 4601-I. One-gang Plate, brown Bakelite, No. 4602. Same in Ivorylite, No. 4602-I.



Above: No. 4601
Below: No. 4600-I

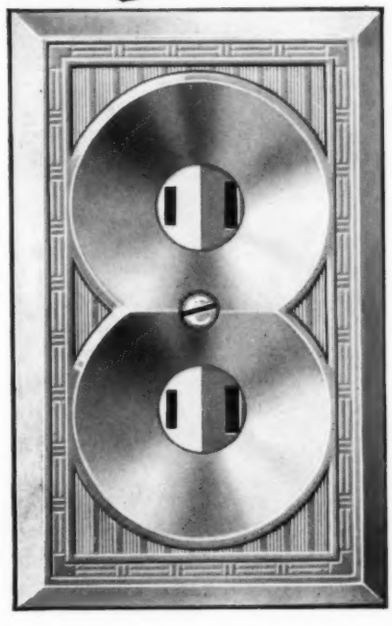
Entirely *new* design-feature

You can close your eyes and plug in without fumbling!

In all former designs the finding-grooves have been confined to the face of the *receptacle.* Now the center-finding surface has been extended *beyond* the receptacle-body; it's in the *plate.* The flaring, curved surfaces of the plate guide the plug-prongs to the center of the "dished" area, so a slight pressure against the central (vertical) ridge slips the blades into the slots.

This device lifts Duplex Receptacles from lower-priced competitive types. Gives wiring jobs a new *distinction* in utility and style. Steps up the quality of a job in a way that customers can *SEE* . . .

Order by catalog numbers given above — to share at once in the sales-volume that's *here from the start!*

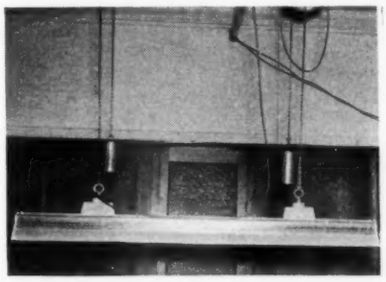


HART & HEGEMAN DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC CO. HARTFORD, CONN.

WIRING Methods

[FROM PAGE 24]

ering for broad or concentrated illumination. Mr. Martin uses this handy fixture in his office and many of his



ADJUSTABLE MOUNTING using counter-weights permits variation of fixture mounting heights for individual tasks.

customers who have seen it quickly placed orders for similar units.

ADJUSTABLE BOX SUPPORTS

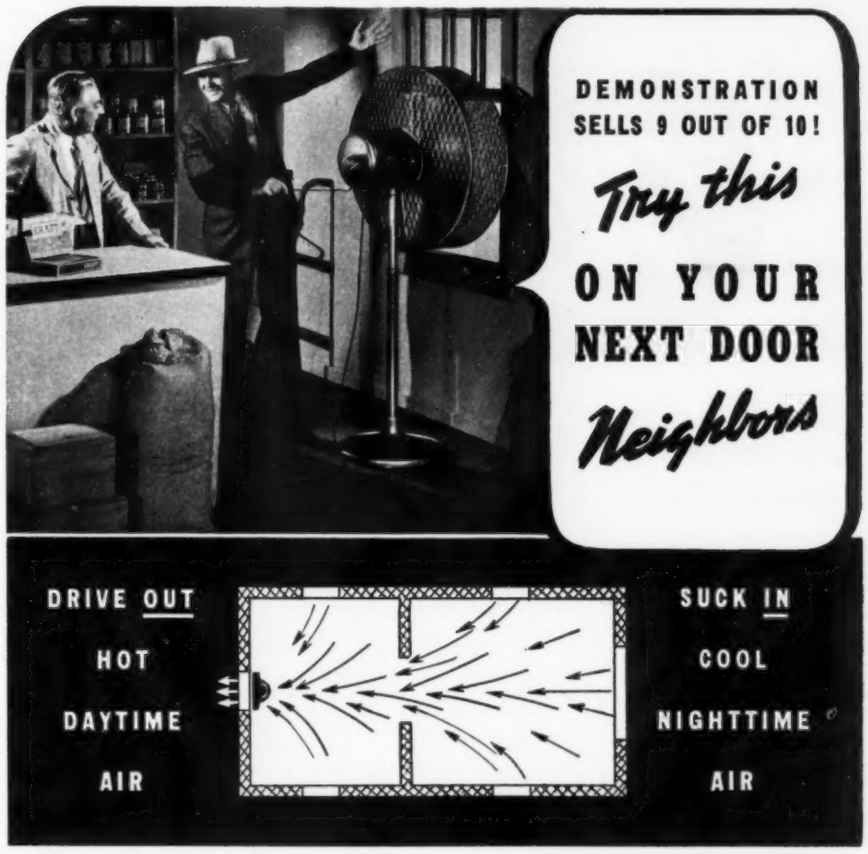
Box supports, for outlets located in partitions on a concrete floor slab job, are made up in the field shop of the M. B. Foster Co., electrical contractors of Boston, Mass.

The supporting brackets are made of ¼-inch by ¾-inch galvanized flat iron. The bottom of the bracket has a 3-inch flange with two holes for mounting to the wood forms, while the top has a 4-inch slot for height adjustment of the

NAIL SETTINGS on field work bench speeds up assembly of adjustable outlet box supports. This is being used on a large Boston housing project.

box. The boxes are ordered with holes drilled in two of the sides for mounting to the bracket. Two short stove bolts fasten box to the support.

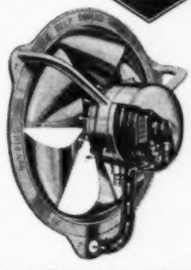
Driven into the shop workbench are a number of nails to give mounting settings for the various outlet heights. All a mechanic has to do is place the box in one setting, the bracket in its proper one and insert the bolts, all of which eliminates the necessity of using a ruler each time a box is made up.



Cash-in fast this summer selling

ILG **NIGHT COOLING**

FOR STORES, OFFICES AND HOMES



It's all yours!—extra cash for that vacation . . . money-making, agreeable work for "heat-wilted" salesmen . . . a wide-open market *with* full profit margins, *without* trade-in allowances! Order an ILGWIND now . . . place it on a "free trial" basis at a convenient window in one of your neighbor's stores . . . in the home or office of an acquaintance—then TRY to take it away the next day! Act fast while the heat's on—ask your distributor or write today for details —Ilg Electric Ventilating Company, 2879 N. Crawford Ave., Chicago, Ill. Offices in 41 principal cities.

BUILT-IN TYPE Permanently installed in stores and offices, also attics of homes. Night operation drives out hot, daytime air; sucks in cool, refreshing nighttime air. Also, circulate air and ventilate building during day, if desired.

PORTABLE TYPE ("ILGWIND" as illustrated above) Just place it in front of an open window and plug it in—no installation required! Ideal for night cooling of small stores, office suites, homes and apartments up to 8 rooms. Two-speed motor. Two sizes.

See ILGATTIC Systems and ILG Kitchen Ventilating Fans in actual operation in model homes at New York and throughout America.

ASK YOUR DISTRIBUTOR ILG OR WRITE TODAY FOR DETAILS

Vitalized VENTILATION

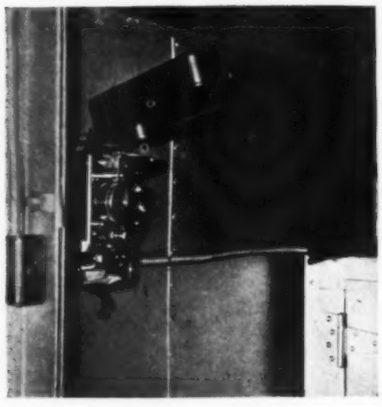
AND AIR CONDITIONING

★AIR CHANGE...NOT JUST AIR MOVEMENT!

Motor Shops

TIME SWITCH OVEN CONTROL

Late evening or overnight bakings are no chore in the motor shop of Electrical Engineering and Service, Inc., Westfield, Mass. The electric ovens, both small and large, in this shop are equipped with a time switch which turns on the current at a predetermined time and for a long bake, shuts it off 8 hours later. When the shop is opened in the morning the motor is cooled off, ready and waiting for its second dipping and baking. Various settings are available on the switch depending upon the duration needed for the specific baking process. In addition the ovens are thermostatically controlled for temperature.



***TIME SWITCH** control for electric bake ovens permit accurate overnight baking and facilitates record service.*

The switches have paid for themselves over and over again in terms of convenience, energy and time saved, and quick, efficient service to the customers.

SHOP LIGHTING

Shop lighting at the Tri-State Armature and Electrical Works in Memphis, Tenn., provides 16 to 18 foot candles of general illumination and is operated from a unique circuit.

The units are connected across a 240 volt 3 phase circuit, 2 lamps in series across each phase for each circuit. Both switching and overcurrent protection is provided by small 3 phase circuit breakers mounted at convenient columns. The lamps used are 200 watts but the circuits are designed to handle up to 500 watts per unit.

***GENERAL SHOP** lighting employs 3 phase circuit and circuit breaker switching.*

SAND BLAST CLEANING

A sand blast mechanism is used in the motor repair shop of M. H. Salmon Electric Co., Syracuse, N. Y., for cleaning short circuiting devices, lugs and other small items which are difficult to clean.

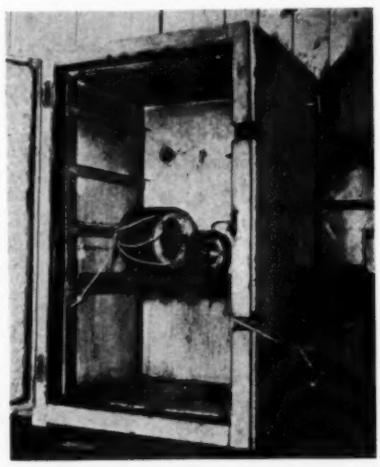
The blasting chamber consists of a sheet metal box 19-inches by 10-inches by 16-inches high. On the one side is a sliding metal door through which the equipment to be cleaned is inserted. Two heavy rubber gloves are fastened to circular openings on either end of the chamber. The operator places his hands in these gloves to hold the equipment to be cleaned. The top of the chamber has a sight glass through which the operator can see the cleaning process. A foot lever valve controls the compressed air which enters the chamber at about 85 pounds per square inch and picks up the fine beach sand through a syphon arrangement. A vent pipe connected to the top of the chamber carries off the dust resulting from the blasting operation.

***SAND BLASTING** facilitates cleaning of short circuiting devices, lugs and other small items in this motor repair shop. Since the operation requires only a few minutes, much time and labor is saved.*

SMALL OVEN

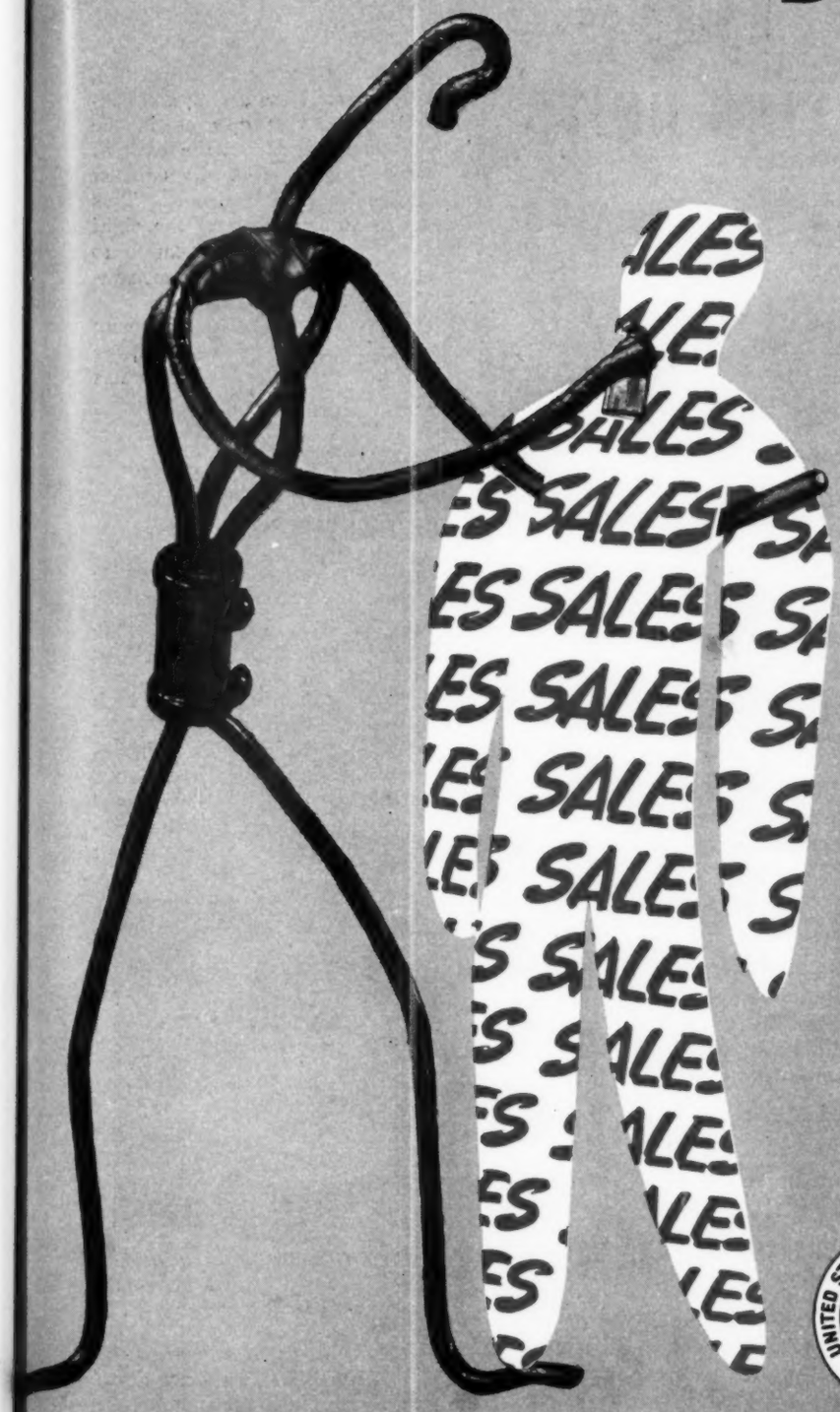
To cut down energy costs for heating and baking small rewound motors, Superior Electric Motor Repair, Inc., of Hartford, Conn., constructed a small electric oven.

The oven is built from an old electric refrigerator. The refrigerator mechanism was removed and the interior lined with transite board. A rack made of flat iron and angle iron shelf supports was installed to permit the use of more than one shelf. Three 250



***SMALL ELECTRIC OVEN**, mounted on top of large oven helps reduce cost on small motor rewind jobs.*

HOW TO REVIVE "DROOPING" WIRING SALES



U. S. Rubber's new small diameter Laytex* "Dilec" building wire is stimulating commercial building rewiring jobs all over the U. S.

Flame retarding, moisture resisting, smaller in diameter, and wrapped by a unique method that provides an absolutely uniform fibrous covering . . . U. S. Laytex* "Dilec" Type R. U. branded wire gives you a new entry into the rewiring market! Provides you with a new opportunity to *increase* sales! A new-type construction makes U. S. Laytex* "Dilec" small diameter building wires the most economical to use in all types of commercial buildings requiring rewiring. Look for the "U. S." name branded clearly on each wire! It's your assurance of highest standards of wire manufacture. See your U. S. Rubber Distributor today!

You cannot buy a smaller diameter wire than U. S. Laytex* "Dilec".

Laytex* DILEC

*REG. U. S. PAT. OFF.

UNITED STATES RUBBER COMPANY
ROCKEFELLER CENTER, NEW YORK

S. Laytex DILEC - - - 10 RU 600V - - - LATEX GRADE - - - 10 RU 600

NOTHING INSULATES LIKE RUBBER...
U. S. Laytex* IS RUBBER INSULATION AT ITS BEST

*REG. U. S. PAT. OFF.

THE NEW WHEELER
VAPOR-PROOF
FLUORESCENT LIGHTING UNITS

Wheeler VAPOR-PROOF Fluorescent Units are made for use in food plants, foundries, and similar locations where it is necessary to protect lamps, sockets and reflecting surfaces from moisture, dust, smoke and vapors.

In locations such as food plants where it is desirable to take extra precaution against lamp breakage, it is recommended that these units be equipped with safety sheet glass covers for maximum protection.

When used with the "Daylight" Fluorescent lamp, these new units provide a cool, efficient, color-corrected Daylight quality illumination which tends to reduce spoilage and rejects. Units are easy to install and easy to service.

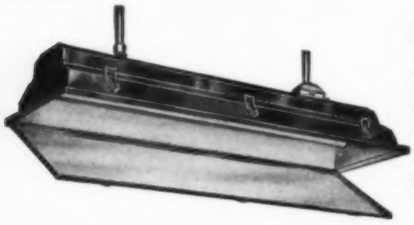
The entire outer body of the reflector, including its closed ends, is enameled in one piece. All sockets and lamp operating equipment are mounted on a wiring channel which is installed through the mouth of the reflector.

The mouth of the reflector has a recessed flange to receive the hinged glass cover which seats against cushioning gaskets to form a moisture and dust-proof seal.

All units are supplied complete with the latest type of ballast equipment employing separate and renewable starter switches. Two lamp fixtures are supplied with high power factor Tulamp ballasts resulting in an overall power factor above 95% and greatly minimizing any stroboscopic effect. A starting compensator is included in all two lamp units.

Capacitors for power factor correction can be supplied on all single lamp units.

Fixtures are furnished *wired,* with pigtails left for connecting to branch circuit.



HINGED DUSTIGHT GLASS COVER

The Hinged Dustight Glass Cover is readily opened for access to lamps or starter switches by releasing toggle latches. Units can be supplied with ¼" Water White Plate Glass, ¼" Tempered, Clear Safety Plate Glass or with ¼" Double-thick Plain Clear Glass.

For complete data write for New Bulletin No. 60-A

Distributed Exclusively Through Electrical Wholesalers

WHEELER REFLECTOR COMPANY
275 CONGRESS ST., BOSTON, MASS.

NEW YORK ATLANTA CLEVELAND

Motor Shops

[FROM PAGE 28]

watt strip heaters, connected in parallel, furnish the heat for the drying and baking process. A vent opening in the upper left hand corner of the back of the oven is connected to the exhaust vent for the larger oven below. This vent and a small opening in the right side of the oven afford ventilation to carry off any fumes which may accumulate.

This addition to the shop equipment eliminates the need for using the large oven for small work and already has proved its worth.

PORTABLE STATOR TURNTABLE

The J. J. Reddington Electric Service Co., of Boston, ever on the lookout for labor saving devices in its service shop, has built a portable table with a turntable stator vise for rewind work.

The portable table is 35-inches high and has a surface 30-inches square. The base for holding the stator is 12-inches by 21½-inches and revolves freely on a ball bearing collar. The two wood wedge blocks are fastened by bolts passing through long slots which permit

STATOR TURNTABLE on portable shop bench facilitates efficient handling of stator rewind jobs.

adjustable settings to fit any armature from ½ to 15 hp. The blocks are tightened securely by nuts under the base which is 4-inches above the table top, giving ample hand room. This also permits revolving the rack when tools and equipment are on the table top. Two right angle hooks, screwed into the vertical side of one of the wedge blocks, holds the coils or coil groups until they are placed in the slots. The entire unit can be rolled to any portion of the shop, giving flexibility to use of floor space and lighting facilities.

WIRE AHEAD *with* LEVITON

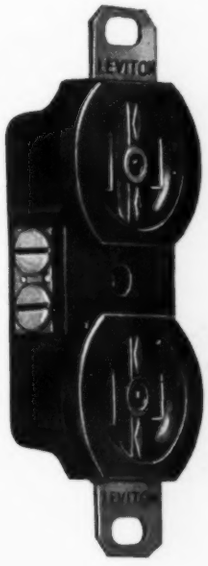
Quality

WIRING DEVICES

Ask for this complete catalog and data book. *You'll find pages full of essential wiring devices — new and old, better made, better priced, and always in stock ready for prompt delivery.*

The Kwikchange Line—increasing in demand. Its users know the reasons why. Try them on your important job and convince yourself.

Typical of the Leviton line of popular priced switches is the 1030 line which is made of Bakelite fully enclosed and permanently assembled to stay out.



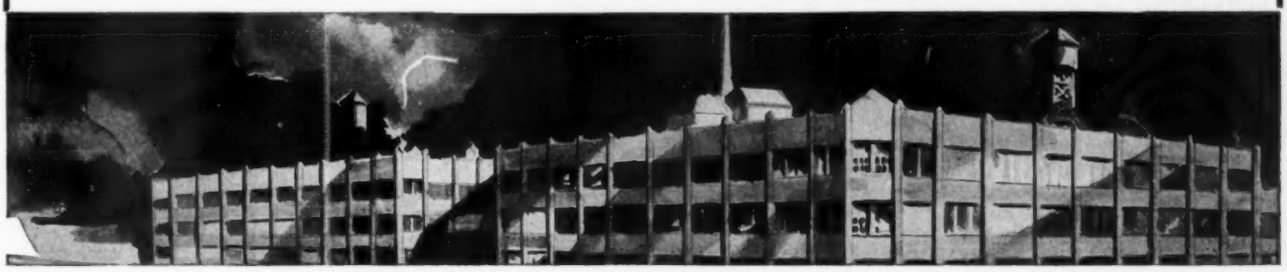
The 222 duplex receptacle is another example of Leviton leadership in the wiring device field. A quality item priced to suit the most economical demands.

Switches and Receptacles for every type of job—small and large, modest and elaborate. Leviton manufactures a full line of switches to meet all specifications and all budgets.

Say "Leviton" on your next order from your local wholesaler

LEVITON MANUFACTURING CO.

236 GREENPOINT AVE. BROOKLYN, N. Y.
CHICAGO, ILL. 111 No. Canal St.
LOS ANGELES, CALIF. 420 S. San Pedro St.



Better Lighting

THE HIGH COST OF INADEQUATE WIRING

This is a subject which is of real interest to every electrical contractor because inadequate wiring means business to be had. The following calculation, prepared by G. S. Merrill of the Nela Park Engineering Department of the General Electric Co., Cleveland, shows the actual waste which results from poor wiring. It is an example based on use of 300-watt 115-volt mazda lamps. This is good ammunition that should help in getting business.

	Low Voltage Drop	High Voltage Drop
Assume Voltage at Service (meter).	117.	117.
Assume Total Voltage Drop (meter to socket)	2.	10.
Socket Voltage	115.	107.
Lamp Watts	300.	268.5 (89.5%)
Lumens	5910.	4628. (78.3%)
Amperes (Lamp Watts Divided by Socket Voltage)	2.61	2.51
Watts Lost in Wiring (amp. x drop).	5.22	25.1
Watts Consumed by Lamp	300.	268.5
Total Watts Consumed	305.22	293.6
Overall Efficiency, Lumens Per Watt	19.35	15.75

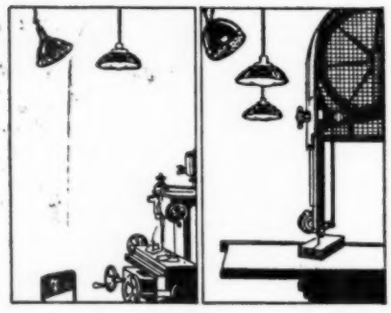
23% more light for each watt consumed in the system with 2 volts drop. For the 11.6 additional watts consumed in the well wired circuit, 1280 additional lumens are obtained — which is equivalent to 110 lumens per watt. (A 75-watt lamp gives about 1100 lumens.)

Operating Cost — One Socket for 1000 Hours		
Kw-Hrs. Consumed	305.22	293.6
Number of Lamps Consumed	1.33	0.6
Cost of Energy Consumed @ 2¢ Per Kw-Hr	$6.10	$5.87
Cost of Lamps Consumed @ 40¢ net	.53	.24
Cost of Energy and Lamps	$6.63	$6.11
Lumens	5910.	4628.
Cost of 4628 Lumens for 1000 Hours	$5.19	$6.11 5.19

$0.92 wasted per socket every 1000 hours.

CONCENTRATED BEAM SOURCES

Industrial spotlights will provide high illumination over restricted areas where critical seeing requires from 50 to 250 footcandles—encountered in thousands of applications in the machine tool, woodworking, printing and textile industries. When properly louvered and positioned such units will provide glare-free lighting. Particular

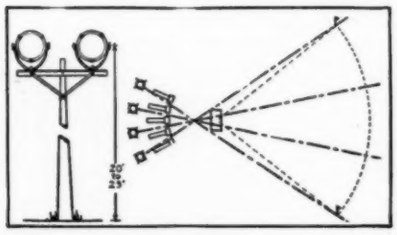


care must also be exercised in their location so that confusing shadows are not introduced.

SUMMER SPORTS LIGHTING

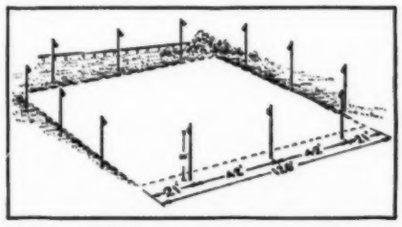
In the June issue of *Electrical Contracting* we published some recommendations, with sketches, for lighting various types of outdoor recreational areas. Here are a few more—

TRAP SHOOTING — Floodlighting stations are placed on either side of shooting platform. The beams from each station are crossed to eliminate shadows. Stray light on platforms is

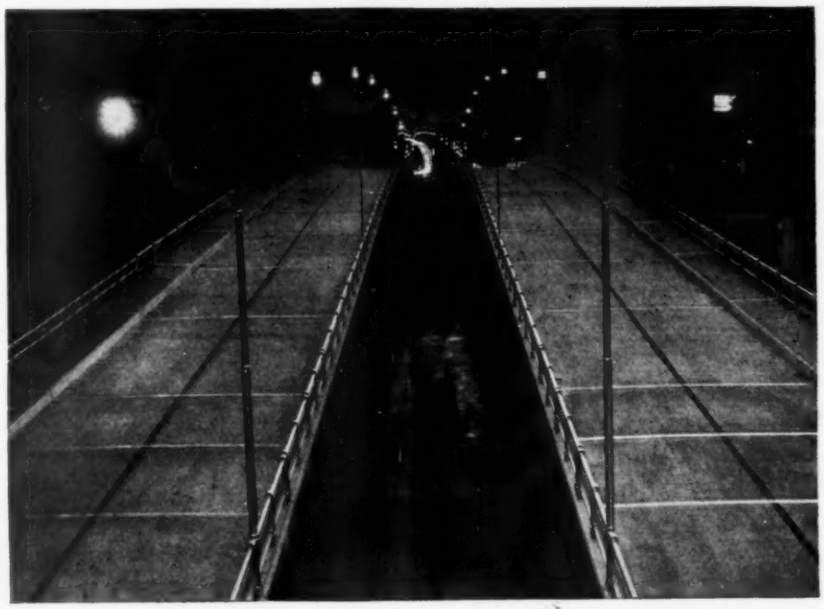


sufficient to sight guns and to facilitate changing positions. Type of projector: eight medium beam floodlighting projectors. Location—four poles (2 projectors per pole) mounted 20 to 25 feet high behind shooting platform. Lamp size—1000-watt.

BOWLING ON THE GREEN—The court, 126 ft. by 126 ft., should be fairly uniformly lighted to about 5 footcandles and from a sufficient number of sources so as to minimize long sweeping shadows.



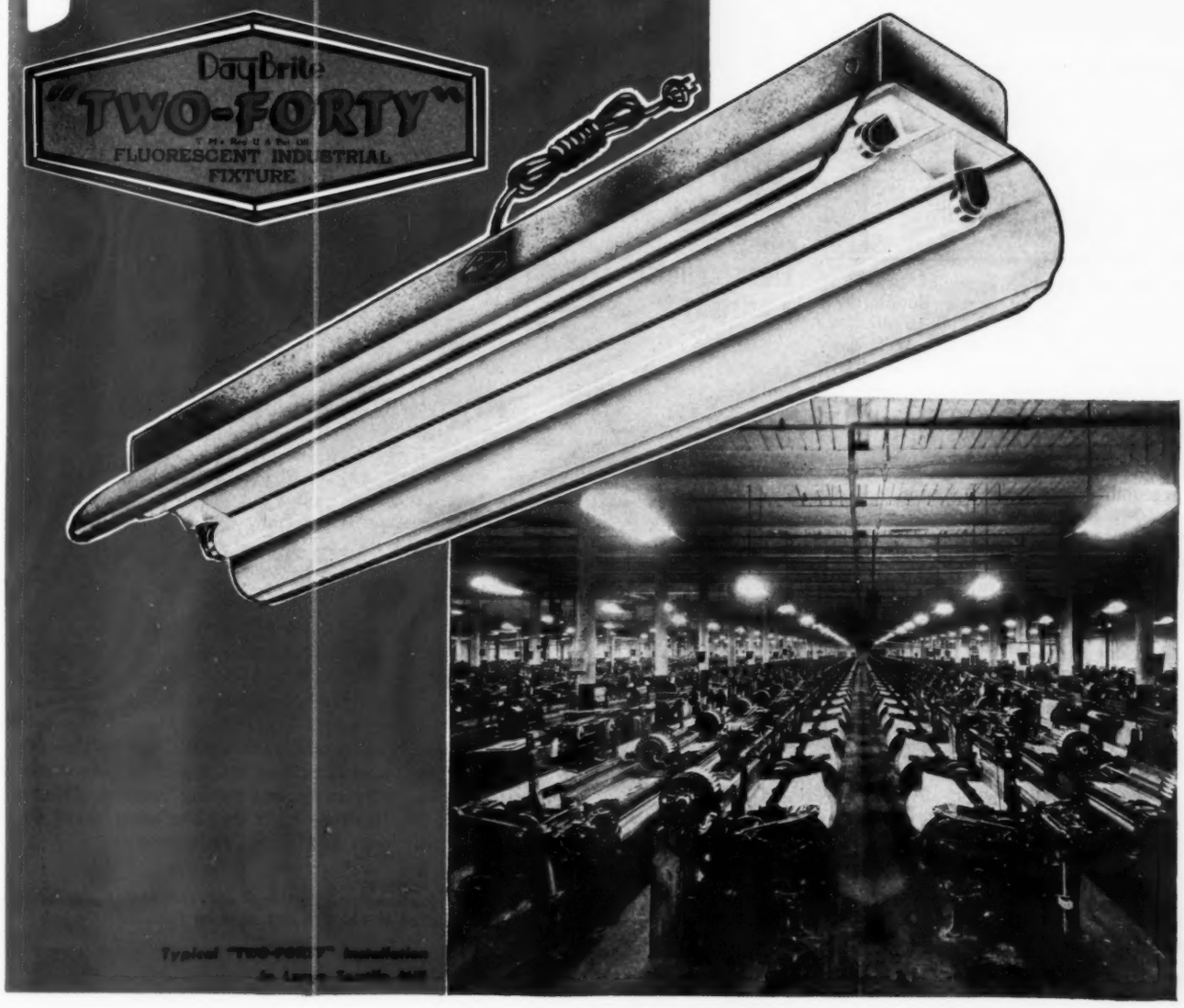
Side lighting: Type of reflector: elliptical angle. Location—21 feet from the ends, 42 feet apart on each of the four sides, and five feet or more outside the boundaries of the green. Lamp



***OVERPASS LIGHTING** — Safety lighting of the Market Street Overpass, opened early this year at Shreveport, La., was accomplished by the use of 14 G.E. Type M2 10,000 lumen sodium vapor luminaires. The units are mounted on a six-foot mast arm with a 31-foot light center over 25-foot, 4-inch roadway. The luminaires are connected in a straight series circuit with an average spacing of 98 feet between units. The installation was made by the Jack Moorman Electric Co. of Shreveport.*

PROOF

OF THE ADAPTABILITY OF THE "TWO-FORTY" FOR ALL TYPES OF INDUSTRIAL APPLICATIONS



Typical "TWO-FORTY" Installation

FOR TWO 40-WATT FLUORESCENT LAMPS

The Day-Brite "TWO-FORTY" is recommended for all types of industrial applications where the ultimate of cool, daylight quality illumination is required. Harsh shadows . . . eye strain . . . spoilage . . . rejects . . . all are eliminated by the "TWO-FORTY". Your particular industrial lighting problem can be solved satisfactorily with this unusual fixture. *Write today for Bulletin F-28 which will give you complete information on the "TWO-FORTY".*

FOR SALE BY ALL LEADING ELECTRICAL WHOLESALERS

NEW LOW PRICES NOW IN EFFECT

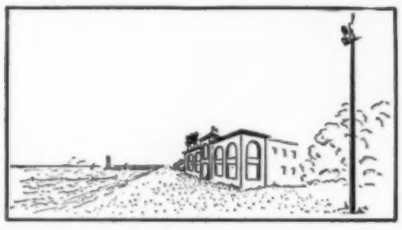
Day Brite
LIGHTING, INC. ST. LOUIS, MISSOURI
5425 Bulwer Ave.

[FROM PAGE 32]

size—750-watt. Light center—20 ft.

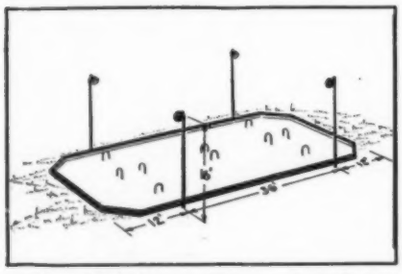
Overhead lighting: Type of reflector: RLM domes. Location—25-foot centers, strung 25 feet above green on messenger cables. Lamp size—500-watt.

BATHING BEACHES—The swimming area as well as the beach should be illuminated. The size and type of beach determine projector locations, di-



rection of beam. Type of projector: banks of narrow beam floodlighting projectors. Location—200 to 400 feet apart, mounted 40 to 80 feet high. Lamp size—1000-watt. Footcandles recommended—sufficient projectors located in each bank to provide approximately one footcandle evenly spread.

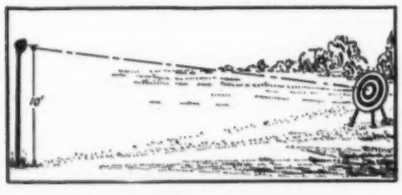
CROQUET OR ROQUETE—Five footcandles recommended for a 30-ft. by 60-ft. area.



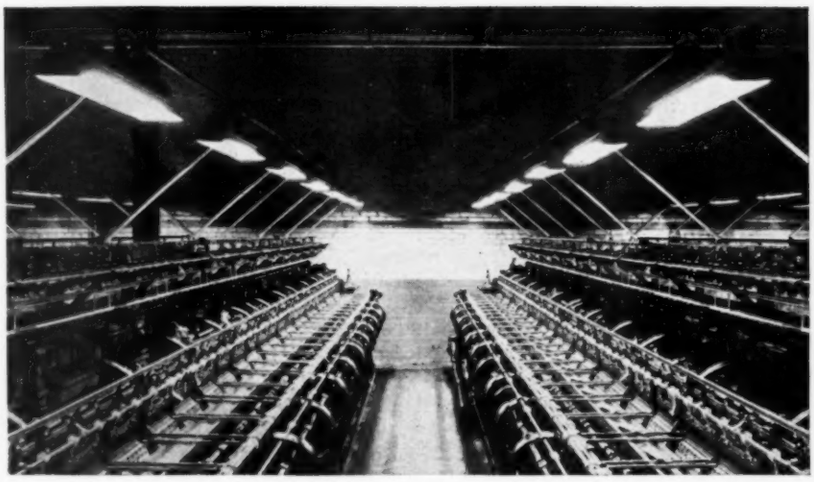
Side Lighting: Type of reflector: open-type angle. Location—12 feet from the end of the court, 36 feet apart, and mounted on 16-foot poles as illustrated. Lamp size—500-watt.

Overhead Lighting: Type of reflector: RLM domes. Location—strung on messenger cables 25 feet above the court on 15-foot centers. Lamp size—300-watt.

ARCHERY—It requires sufficient light not only to illuminate the target satisfactorily but also to light the area sur-



rounding the target. Targets usually spaced about 10 yards apart for safety. Type of projector: one narrow beam for each target. Location—directly behind and to left of archer, mounted 10 feet high. Lamp size—250-watt for average ranges, 500-watt for longer range.



UNIFORM ILLUMINATION *of over 50 footcandles of cool fluorescent light is provided on the needle bar of the knitting machines in this windowless hosiery plant.*

LIGHT CONDITIONING A HOSIERY MILL

The Hudson Silk Knitting Company of Charlotte, N. C., manufacturers of full-fashioned silk hosiery, have a new windowless building. It is air-conditioned and light-conditioned to provide the workers with a comfortable seeing and working environment.

The lighting installation consists of 400 Miller single trough concentrating reflectors. These units are equipped with the 36-inch daylight fluorescent lamp, and spaced 6 feet apart, 42 inches above the needle bar. A uniform average level of illumination of over 50 footcandles is provided.

Because the source is one of large area and relatively low brightness, there are no objectionable reflections from the surfaces of the knitting machines. Then, too, because the source produces "cool footcandles" it has been possible to place it quite close to the operators without discomfort from radiant heat.

LIGHTING A JEWELRY STORE

From Portland, Oregon comes an example of high level lighting in a jewelry store. The example is Paul Feldenheimer's. The sales area of 800 square feet is lighted to 12.4 watts per square foot. There were 93 footcandles of general lighting and 100 footcandles on the displays.

The general installation consists of three 500-watt Curtis indirect units and twelve Holophane lens boxes, 3 lenses per box with 150-watts per lens, equipped with Daybrite concentrating beam reflectors. There are fourteen recessed wall cases, each lighted with three 60-watt Lumiline units and two floor display cases, one having fourteen 25-watt Daybrite units and the other three 40-watt Lumiline Curtis units.

HIGH INTENSITY *lighting provides 93 footcandles of general and 100 footcandles of show case lighting to display the valuables in this jewelry store in Portland, Oregon*

EASY TO INSTALL—*Easy to Sell*

SAVES "CALL BACKS"

*Ask Us Another**

Q. "I have frequently seen your magnetic starters with a push button or selector switch in the cover. What advantage has such control over manual starters?"

With Push-button in Cover—

1. *Undervoltage protection* is provided for safety of operators. This is not possible with manual control. With manual control, when power fails, the motor will stop and will restart immediately upon the return of power. With magnetic control, the motor will not restart after power failure until operator presses Start button.

2. For convenience, in addition to the Start-Stop push-button in the cover, other push buttons can be installed for operating the starter from remote points.

With Selector Switch in Cover—

It is frequently desirable on equipments such as air-conditioners to make the equipment inoperative during inspection, or to turn it on without operating remote push buttons, thermostats, float switches, or other pilot devices. This is easily accomplished with a Hand-Off-Automatic selector switch at the starter.

G-E MAGNETIC STARTERS

If you mention G-E control in your bid, contracts will be easier to close. The wide customer acceptance of G-E control means that less effort will have to be devoted to selling the equipment, and you can spend your time to best advantage selling the work you'll do. On the next page are a few of the reasons why your customers prefer control that bears the General Electric nameplate.

**Future ads will answer other questions on control. You may wish to add these quizzes to your memo file.*

—LOOK AT ALL THESE SELLING HELPS!

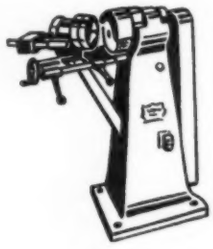
of
you
spark
point of
economy.

Easy to Understand Why

THE NEW SIZE 0 STARTER IS EASY TO SELL....

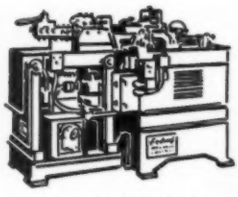
Where to Use THE CR7006-D50

Fans, ventilators, pumps, compressors



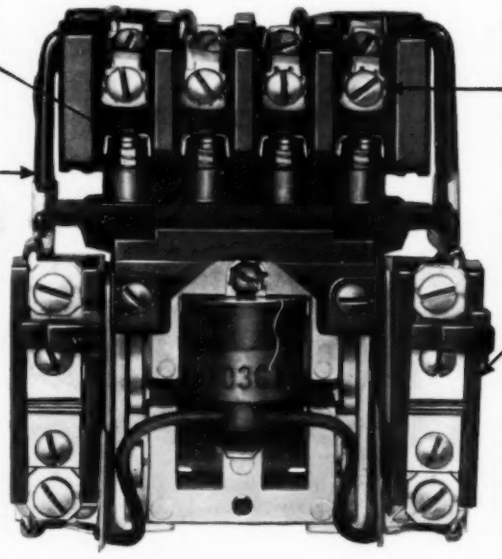
Grinders and small machine tools

Small bench and workshop machines



Automatic forming or processing equipment

Or on any motor up to 1½ or 2 hp



Fine-silver (99.90% pure) tips mean good contact and long life. Filing never required.

All connections made with oil-resisting Flamenol wire, providing neat appearance.

In case of power failure, motor is automatically disconnected—will not restart until operator presses "Start" button.

Operates from one or more remote push-button stations, or automatically from float, pressure, time, or limit switches.

Saddle-type terminals hold up to No. 12 wire firmly—eliminate need for wire bending, which makes connection easier.

New overload relay using bi-metal strip provides accurate overload protection for motor. Interchangeable heater suits relay to any motor within rating of switch.

Obtainable with push button or "Hand-Off-Auto." selector switch in cover of enclosure.

In a recent independently conducted survey, 10,000 industrial executives were asked, "Taking into consideration quality, price, and service, when you are next in the market for motors and control, which manufacturer would be your first choice?" These are the results.

GENERAL ELECTRIC	55.5%
COMPANY B	20.0%
C	2.7%
D	2.0%
E	1.6%
OTHERS	18.2%

This small starter embodies all of the quality features of larger G-E magnetic starters. You can see the care that has been taken in its design and manufacture to assure that your customers will receive the benefit of long and trouble-free operation.

You'll find that it's easy to sell—both because of its quality, and because of the preference of control users for G.E. There is a General Electric distributor near you who has a complete stock of this starter and the other G-E motor starters. General Electric Company, Schenectady, N. Y.

Write for literature on the new Size 0 starter and the name of your G-E distributor

GENERAL ELECTRIC

676-19

Industrial Electrification and MAINTENANCE

A NEW SERIES ON

Industrial Electrical Problems

AMERICAN industry today faces the staggering problem of making the multitude of things that our people must have in order to live and at the same time taking on the added burden of expanded production to meet re-armament needs. Everyone who is doing industrial electrical work has heavy responsibility for making the wheels turn rapidly and without interruption.

If machinery is to operate smoothly, every precaution must be taken to keep the electrical system functioning perfectly. Where necessary, existing systems must be added to or reconstructed to provide the most efficient applications of light and power.

Electrical Contracting is prepared to help its readers reach these objectives in two ways:

1. Feature articles will give up-to-date data on new methods of solving problems in lighting and power applications.

2. This special section will cover the broad principles of maintaining electrical systems at peak efficiency.

Because this second activity is so important to all plants—small as well as large—the name of this section has been changed to INDUSTRIAL ELECTRIFICATION and MAINTENANCE. But this is more than just a change in the name.

In past months we have covered the application of specific types of products in industry. Beginning with this issue, we will devote our attention to the problems involved in maintaining *complete* electrical systems. This month we review the things that should be done to simplify electrical maintenance.

Future issues will deal specifically with the following subjects:—

Preventive Maintenance
Reducing Power Costs
Maintaining Good Power Factor
Meeting Severe Service Conditions
Safety Protection for Electrical Operations
Increasing Flexibility of Electrical Service
Providing Adequate Capacity for Increased Demand
Extending Automatic Control
Electrifying Operations to Reduce Unit Costs

In the months ahead, both speed and thoroughness will be essential. Every man who is in any way concerned with industrial electrical work will be carrying a heavy responsibility. These articles are dedicated to just one purpose—to make that load of responsibility as easy as possible to carry under a simplified schedule of operation.

Simplifying Electrical Maintenance

Effective maintenance of industrial electrical systems primarily involves regular and thorough inspections, and the taking of clearly indicated precautionary measures. Once a system is installed, the job of making it run should be relatively simple, provided the work is properly organized and fool-proof methods are adopted to keep the system under constant supervision.

In setting up the methods to be followed, simplicity should be the keynote. The whole aim should be to uncover defective conditions before they become serious, or, when real trouble develops, to make possible speedy repairs with a minimum of lost productive time.

There are eight features to be taken into consideration when organizing maintenance routine. These eight features are here discussed in detail, with a guide chart which will help to prevent overlooking vital details.

1. PERIODIC SURVEYS—One of the main steps in simplifying electrical maintenance and reducing maintenance costs is to make periodic surveys of the complete electrical system. Through these surveys, weak points will be located, and, if these are given attention, damage to equipment and interruptions in production can be prevented.

Load tests on feeders and branch circuits indicate whether conductors have ample capacity. Power factor for the system, and for parts of the system, should be determined. Low power factor affects the system capacity, and when it is improved the result will correspond to that of increasing the size of the conductors. Insulation tests indicate the condition of the installation and will show whether resistance is safe, or too low. It will indicate the possibility of a ground or short circuit.

2. PROTECTING WIRING — When conduit is installed for horizontal runs, it should have a slight slope, and be void of sags, pockets or traps, and loose couplings. The purpose is to prevent moisture being trapped and to eliminate premature insulation failure. In one case on our records telephone cables had to be replaced four times within a year because of moisture damage, although each time the conduits were swabbed dry before new wires were installed. Under such conditions, lead covered cable would have been the type to use.

As a corollary—wires and cables run in damp or wet places should be not only properly insulated but also suitably protected against moisture.

Also low-tension systems should not be overlooked. The original installation should get as careful attention as the light or power system, with particular care that voltage drop is kept low. Otherwise, the maintenance of the systems will give endless trouble. If conductors are properly insulated and connections are kept tight and protected from dust and corrosion, the electrical maintenance man will be relieved of some severe headaches.

A word about the size of wires and cables. Installations of conductors of adequate capacity not only keep voltage loss low but low voltage loss feeder design usually provides a margin of safe current capacity which may be utilized for emergency or temporary loads. The design may also include extra capacity which can be utilized when plant operations are expanded. In other words, when a feeder is installed it is well to plan for future as well as present loads.

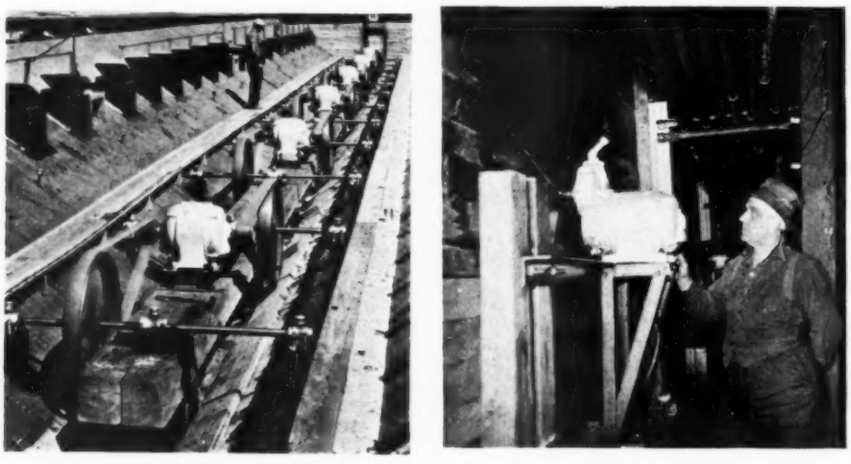
In any installation, conductors should be run so that they will be protected from mechanical damage. For example, the swinging of a jib crane may strike and damage conductors on a nearby wall. Another instance, an extension cord should not be run across an aisle, where it may be struck by falling objects or run over by trucks.

3. CENTRALIZED CONTROL—Proper selection and application of control for motors is the first step to assure low upkeep and best performance of this class of equipment, it being assumed that the proper type of motor is installed (see *Electrical Contracting,* February and March 1938).

Safety switches and control can often be centralized or grouped for the most economical maintenance and for the conservation of floor space. These results, in addition to avoiding mechanical vibrations from punchpresses and rolling machines, were obtained in the factory of the Rheem Barrel Co., Newark, N. J. At this plant the controls for various machines needed for the manufacture of steel drums and barrels were placed on three 18- by 10-ft. platforms, approximately 20-ft. above the production floor and under a monitor-type roof. The switches and controls were mounted back-to-back on a vertical angle-iron framework.

With a view to saving space and keeping all transformer equipment in one location, Hazel-Atlas Glass Co., Washington, Pa., makes use of a packaged substation and of a rigid steel tower on which are mounted primary switching equipment and distribution transformers. The unit substation consists of a 300-kva., 2400/480/240-volt, three-phase, 60-cycle transformer, with complete auxiliary equipment.

The tower supports three 100-kva., single-phase transformers which supply power to one of the manufacturing departments, and also serves as the receiving point for the incoming power service. Bus bars are mounted near the top truss, also a gang-operated air-break switch. A connection is made



***HIGH-HEAT-RESISTING MOTORS** with built-in gears and sealed bearings saved supervisory and inspection time at Northwest Lumber and Mfg. Co., Everett, Wash. The motors were direct connected to kiln fans which were reversed every 24 hours. With the new set-up (left), drive and fan operations can be inspected while kiln conditions are noted. The old-style tandem drive (right—with housing removed) resulted in power loss, slippage and poor control of drying, and required close attention to operation of equipment.*

MAINTENANCE GUIDE CHART

SIMPLIFYING ELECTRICAL MAINTENANCE

High-voltage and Switchboard Rooms

Install adequate lightning protection.

Periodically inspect oil levels in transformers and circuit breakers.

Shut down equipment for servicing at "off" hours only.

Remove and replace defective insulation at a time other than plant working hours, if possible.

Install a ground detector, preferably on the switchboard where it can be observed continuously.

Provide a framed schedule for daily, weekly, monthly, and yearly inspection of equipment. Ask equipment manufacturer for recommendations.

Carry in the switchboard room a stock of repair parts including fuses, links, etc., for all equipment in that room.

Distribution System

Install duplicate feeders. Alternate in service weekly, if possible.

Use conductors of adequate capacity to provide for plant expansion and to take care of changes in plant machinery layout.

Use lead-covered cable or corrosion-resistant conduit where needed.

Provide identification of systems by different colored painting on conduit, bus enclosures and panelboards.

Make regular surveys to check insulation resistance, load, power factor, voltage drop, and other operating conditions, and compare with results of previous surveys.

Periodically inspect all indoor and outdoor systems to make sure that no equipment has been installed or placed where it is exposed to mechanical damage.

Regularly check circuit protective devices for correct settings for respective circuits, also have them marked or labeled plainly for correct and quick replacement.

Have a master key (in duplicate) to fit *all* panelboard locks.

Provide for draining of ducts and conduit.

Motors, Control and Branch Circuits

Install circuit protective devices so that they cannot be altered by unauthorized persons.

Group safety switches and control where possible.

Provide each workman with his own lock for locking out motor and other circuits.

Use motors, control, wiring and fixtures suitable for the atmospheric conditions.

Select starters and controllers with contacts of adequate current-carrying capacity to provide for frequent starting, stopping and reversing.

Follow standard hook-up diagrams strictly and avoid costly trouble shooting on unfamiliar short-cut wiring.

Install motors having suitable starting and running characteristics, and of the nearest standard rating (usually the next size larger in horsepower) suitable for the driven load and speed.

Install ground connections of suitable capacity. Check regularly to be sure connection is solid.

In general, replace motors (particularly a.c.) carrying loads less than 75 per cent, with a motor that will operate close to 100 per cent load. Also, replace motors carrying loads beyond their service factor, with a motor of the next larger standard size.

Locate motors and control where they will have good ventilation and be free from vibration.

Make inspections and service all equipment according to schedule.

Carry an adequate supply of renewal parts for motors and control, preferably in each building and main department; also one or more complete spare units, depending on the quantity in use.

Lighting and Branch Circuits

Have each circuit labeled or marked at panelboard.

Use rubber handle or recessed switches to minimize breakage.

Use theft-proof sockets for fixtures that are within reach of workers or visitors.

Maintain a cleaning schedule for lamps and reflectors.

Regularly make light-meter readings.

Have spare lamps stored in each building or each major department; also have parts available for fluorescent fixtures.

Use lamps of correct voltage on all circuits; also use lamps designed for rough service where shock and vibration reduce lamp life.

Miscellaneous

Make up spare portable cord sets, and similar emergency equipment, during "off" hours.

Have a stockroom or a maintenance "substation" in each building and main department, complete with simple stock of wire, fuses, lamps, motor and control parts, instruments, tools, extension cords.

Draw at least a rough wiring plan of the plant.

Repaint scratched or damaged surfaces of circuit breakers, transformers, control and other equipment to prevent corrosion.

Every three months test oil in circuit breakers, and, at least once a year, in transformers.

Remove temporary alterations or replace them by permanent installations.

Remove all unused and abandoned wiring and equipment.

through a pothead and lead-sheathed cable, to supply the substation.

4. BUILT-IN MOTOR PROTECTION—Motors often carry high peak loads because of rapid duty cycles which increase the temperature inside the windings and shorten the life of the insulation. Also, motors are operated quite frequently in places where the ambient temperature is high or in areas that have very little ventilation, and sometimes are dust laden or clogged with lint. These conditions cause the motor to heat excessively and shorten the insulation life.

To keep close control of such conditions, a temperature-registering device can be mounted directly on the motor. Suitable leads extend to the motor windings. The device can be used to shut off the motor or to flash a light when the temperature reaches the danger point. Another form can be used as a temperature indicator. The latter can be mounted also on bearings. By the use of such devices needless breakdowns can be avoided or reduced.

5. DUPLICATE FEEDERS—In many plants one feeder is used for both power and light service. But when the feeder is overloaded or a short circuit occurs, causing a fuse to blow or a circuit breaker to open, the entire section served by the feeder is without power for light as well as power for operating the machines. For such installations it is advisable to have a separate feeder or circuit for furnaces, ovens, welders or motors, and another feeder for lights.

As a further assurance against interruptions some plants have duplicate feeders installed. In case of a failure on one feeder the other can be used to carry the load; or if one has been idle, it can be connected in and the power interruption will be of short duration.

Another method for continuous supply of power is to tie-in the far ends of two feeders, and install switches to sectionalize each feeder. With this arrangement work can be done on one section, after pulling two section switches, while the other section remains in service.

One company made a tie-in as just stated and obtained another result—an appreciable reduction in voltage variation which had been a serious difficulty when only one feeder was used.

Another cause for interruptions may be low power factor. The Hygienic Products Co., Canton, Ohio, makers of Sani-Flush, had such an experience. They had a 50-hp. motor driving a pump. Often the operation of the motor dimmed the lights; also the motor would overheat; and sometimes the fuses would blow, thereby stopping work in the plant. An instrument survey was made and the distribution system was found to be carrying too heavy a load. The survey also showed that the system had a low power factor which was the primary reason for the interruptions. Two capacitors were installed, a 30-kva. unit at the motor and a 20-kva. unit at the plant distribution panel. Since this installation was made the plant power factor has been approximately 100 per cent and both overheating and fuse blowing vanished.

CONSERVING GROUND SPACE—Three 100-kva. distribution transformers and switching equipment for incoming power supply are elevated on a tower.

6. USE MORE INSTRUMENTS—Electrical measuring instruments and recorders are, of course, important for making tests, but they also should be used widely in the day-to-day operation of industrial equipment.

Plant equipment must be operated and maintained at maximum efficiency if the utmost in return is to be derived from machinery investments and power costs.

Instruments not only indicate electrical conditions in the motor circuit, but provide the means of determining and controlling unfavorable operating conditions that contribute to frequent interruptions, high costs, and non-uniformity of product.

The only way to be sure that every machine is operating perfectly is to make regular checks of performance. To carry out these tests most efficiently, instrument jacks should be permanently moved into the circuit feeding every important machine. This will permit instruments and recorders to be plugged in when and where required.

7. PORTABLE TEST SET—One piece of apparatus that is most desirable for maintenance purposes is a high-voltage test set. It should be portable so that it can be handled by one man.

Here is how a machine tool manufacturer in New England increased the usefulness and convenient handling of a 2,200-volt testing transformer. The 20- by 24-in. platform carrying the transformer was equipped with four casters. Although the test set weighs 200 lbs., one man can handle it anywhere in the shop. Previously the transformers had handles, and two men were required to transport the unit.

The test set can be plugged into any 110-volt convenient outlet and furnishes 2,200 volts for testing insulation of coils designed for use with magnetic chucks, and checking up the electrical condition of Bakelite parts of machine-tool motors, collector rings and other electrical material.

Suitable protection is connected in the 110-volt supply to the transformer and a pilot light on top of the unit shows when it is alive.

8. RENEWAL PARTS—A sufficient quantity of renewal parts in stock is an essential. When regular inspections are made, the equipment can be serviced immediately and before any trouble develops. The quantity of parts to be carried in stock depends on the amount of duplicate electrical equipment. Some companies using a large number of one kind and rating of devices or apparatus include in their spares one or two complete units. An example is a textile mill having many spinning frames using the same size of motor and the same kind of control. Other plants may need an extensive stock of spares. While this is an individual plant problem, it is obviously better to have too many renewal parts in stock rather than too few. Be sure, however, that stocks are up-to-date.

Some well organized maintenance departments have "substations" in separate buildings and departments for the storage of spares and some tools particularly chosen for servicing and emergency repairs in the respective vicinities.

It's New, and All Set to do a Job!

"3C" Bulletin 6013 TYPE DS—SIZE 0 FORM MC STARTER

Large Electrical and Mechanical Clearances. Plenty of wiring space.

Concentric Knockouts Top and Bottom, both Sides, and Back.

Arc Shield material designed to withstand high temperatures, and is non-carbonizing from arcs.

Large Diameter Push Buttons fully protected to prevent accidental operation.

Double Break Silver to Silver Contacts.

Heavy drawn steel enclosure, finished in Machine Tool Gray.

Molded moving contact holder made of Impact Bakelite to withstand shock.

"STOP-RESET" Buttons are common to prevent destructive attempts to re-start after overload tripping, before solder has solidified.

New Thermal Overload Relay of Solder Pot Type with same desirable characteristics as the very successful Bul. 7322 Thermal Overload Relay.

Hinged Armature Vertical Lift Magnet.

RATING

VOLTS	MAX. H. P. 1 PHASE	MAX. H. P. 3 PHASE
110	1	1½
220	1½	2
440	1½	2
550	1½	2

AVAILABLE

Open or enclosed

With normally open or normally closed control circuit contacts.

In single phase or polyphase types.

In Form MC, with "START" and "STOP-RESET" Button in cover.

In Form MA, with Overload Reset Button in cover. Separate Pilot Device required.

In Form MB, with "MANUAL-OFF-AUTOMATIC" Switch and Reset Button in Cover.

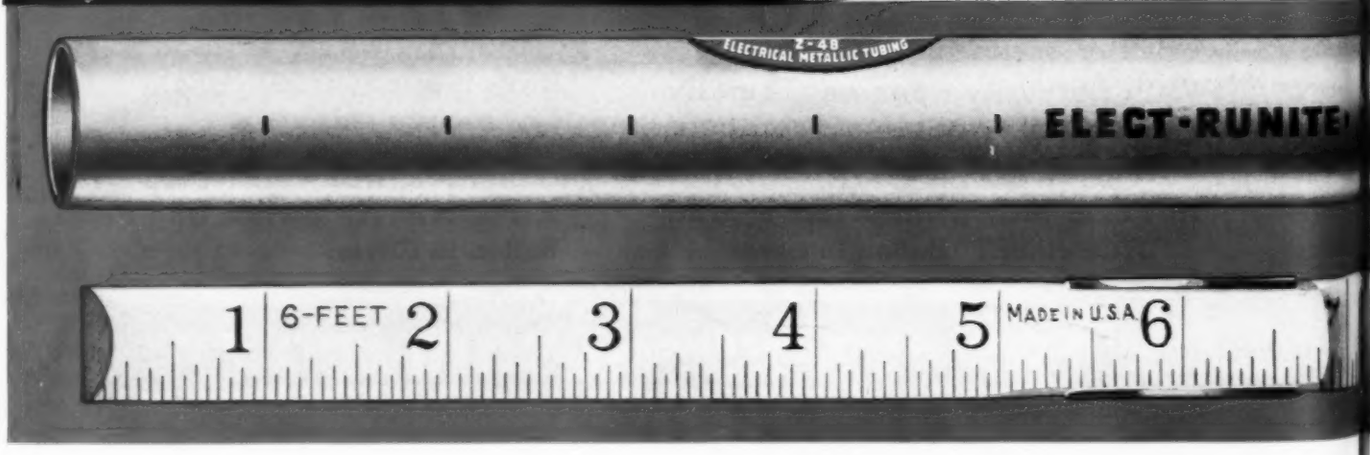
OFFICES IN PRINCIPAL CITIES

THE CLARK CONTROLLER CO.

1146 EAST 152ND ST. CLEVELAND, OHIO

It's easy to find your

NOW—A METHOD FOR MAKING BENDS WITH GREATER ACCURACY AND EASE THAN EVER BEFORE POSSIBLE—To enable you to use "Inch-Marked" ELECTRUNITE STEELTUBES to best advantage, a new ELECTRUNITE Bender has been designed. It is a one-piece casting with no moving parts to get out of order. Simple instructions are built into the side of the bender. With it any standard type or radius bend can be made more accurately, quicker, with less effort and with less flattening than ever before possible. Complete bending instructions and diagrams are provided on a new bending tag accompanying each bundle of "Inch-Marked" ELECTRUNITE STEELTUBES.



...mark- AND KEEP IT WHEN YOU USE "INCH-MARKED" ELECTRUNITE Steeltubes

REG. U. S. PAT. OFF.

It's a simple matter to make true stubs, back-to-back, offset or saddle bends — or to cut accurate short lengths of conduit — when you use "Inch-Marked" ELECTRUNITE STEELTUBES — the electrical metallic tubing with a continuous foot-rule on every length.

"Inch-Marked" ELECTRUNITE STEELTUBES is exactly what its name suggests — tubing clearly marked off on one side in inches. Your mark for bending or cutting already is made for you—and made accurately. It's easy to find by counting off the required feet and inches. And its easy to keep when making the cut or bend. You never need to measure the tubing — in fact, you can use it as a foot-rule. And you can prefabricate bends that always fit from the job blueprint.

"Inch-Marking" — an exclusive ELECTRUNITE feature—makes work on the job easier—insures accuracy in bending and cutting — reduces chance for error — eliminates need for guesswork — saves material.

Try "Inch-Marked" ELECTRUNITE STEELTUBES on your next wiring job. Learn how it can help you — and you'll continue to use it. Steel and Tubes Division, Republic Steel Corporation, Cleveland, O.

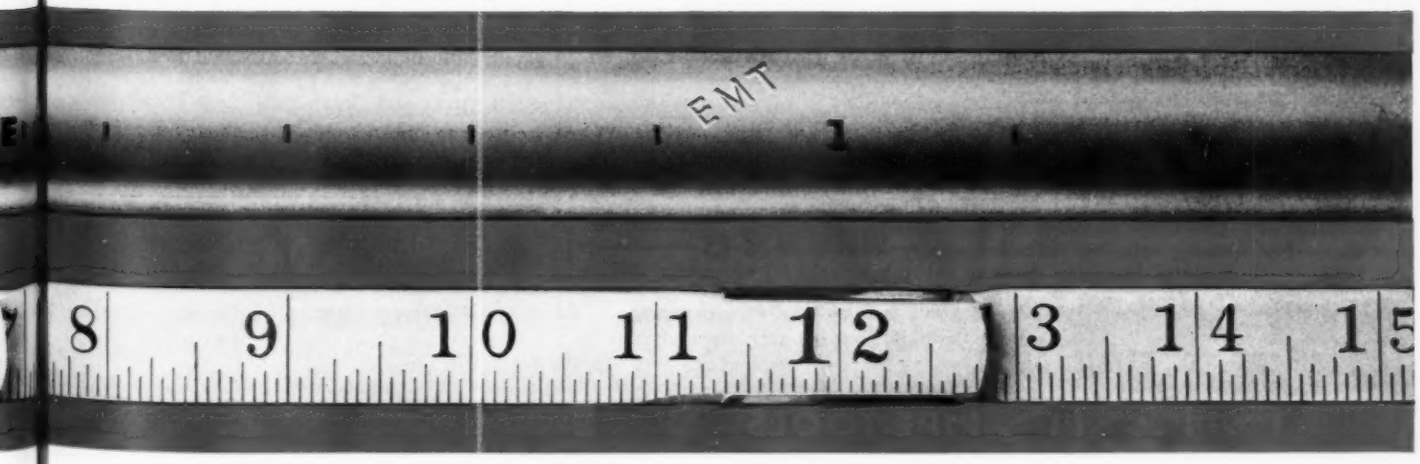
...ERS' LABORATORIES, INC.
...NSPECTED
RIGID
...ETRUNITE
...REG. U.S. PAT. OFF.
...ELTUBES
Z-48
...AL METALLIC TUBING

Look ... new red and black label and ...-marking." They identify genu... ELECTRUNITE STEELTUBES.

SEE YOUR LOCAL ELECTRUNITE DISTRIBUTOR

In addition to being the exclusive distributor for "Inch-Marked" ELECTRUNITE STEELTUBES, he stocks a complete line of dependable electrical supplies. He is equipped to give you prompt delivery—and he can be of valuable assistance in estimating and in helping you to keep jobs moving on schedule.

REG. U. S. PAT. OFF.
REPUBLIC
STEEL



QUICK, EASY INSTALLATIONS!

Simply slip the fitting over the tube, squeeze the B-M Indenter twice—and the job is COMPLETED. That's how QUICK, EASY and PROFITABLE it is to use B-M connectors and couplings.

ALSO

- Save 25% on materials
- Save 25% to 50% on time
- Eliminate complications
- Stronger, neater connections
- No fussing with nuts to tighten

Speed and Accuracy for More Profits!

$1.25 Buys the One Tool Needed

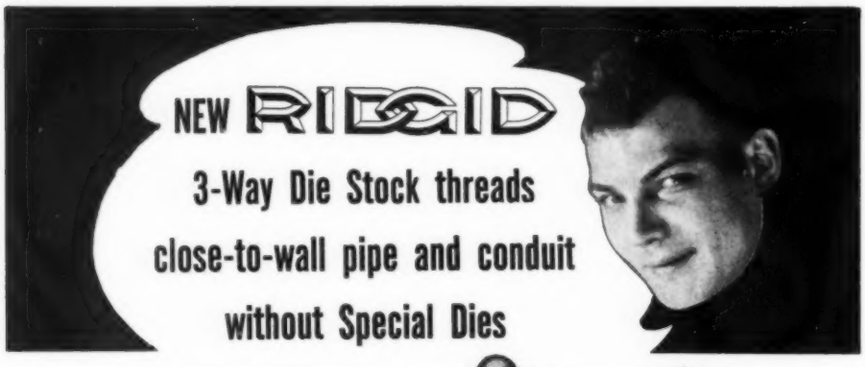
This one patented tool (½" B.M. Indenter) handles 80% of all installations. Pays for itself many times over on the very first job.

Approved by Underwriter's Laboratories

Distributed By:

THE M. B. AUSTIN CO., Chicago, Ill.
CLIFTON CONDUIT CO., Jersey City, N. J.
THE STEELDUCT CO., Youngstown, Ohio
NATIONAL ENAMELING & MFG. CO., Pittsburgh, Pa.
CLAYTON MARK & CO., Evanston, Ill.
GENERAL ELECTRIC CO., Bridgeport, Conn.
ENAMELED METALS CO., Pittsburgh, Pa.
TRIANGLE CONDUIT & CABLE CO., Elmhurst, New York City

BRIEGEL METHOD TOOL CO., Galva, Illinois



This modern tool eliminates the expense and bother of special dies—saves you time and money. Dies are quickly reversed for close work—pipe or conduit against walls. Regular or conduit chaser dies of special tool steel are accurately ground for smooth threading, easily removed for regrinding. Two sizes: No. 30A threads ⅛", ¼", ⅜", ½"; No. 31A threads ½", ¾", 1". Also Nos. OOR, OR and 11R Ratchet Threaders, capacities ⅛" to 1¼" available with conduit dies. For speedy, accurate threading under all conditions buy these famous RIDGIDs from your Supply House.

THE RIDGE TOOL CO., ELYRIA, OHIO

RIDGID 3-Way Die Stocks for small pipe and conduit.

No. OR Ratchet Threader. Die heads push out easily for changing, snap into ratchet ring from either side; reverse for close work.

RIDGID PIPE TOOLS

Micarta Bearings On Ball Mills

The use of micarta bearings instead of metal ones to carry the load on the ball mills of a southern ore plant is reported by The Maintenance Company, Inc., New York City. Water, instead of oil is employed to keep these bearings cool.

The use of water as the cooling medium has these distinct advantages—it carries away from the bearing surfaces the large quantities of dust that enter from the ore-crushing mill and it cannot contaminate the process material.

Because of dust, the wear of metal bearings in the past has been very rapid, while, after eight months of service the Westinghouse Micarta bearing shows no appreciable wear. Furthermore, oil and grease from the conventional bearings are sometimes very detrimental to the material being processed, especially if the ores are to be separated by the flotation process.

The micarta bearings in the first installation in this southern ore plant have reduced the mill-power requirement by 30 per cent. This is attributable to the low friction of the bearings. They carry the relatively light load of 80,000 pounds, turning at 18 rpm.

Conditioned Air for Printing

To insure freedom from troubles caused by excess humidity in printing and lithographic production of greeting cards, year-round air conditioning is materially depended upon by Rust Craft Publishers, Boston.

Uniform results in color printing are even more important than in black and white work. A 30 per cent increase in relative humidity may cause a ¼-in. stretch in a 38 by 50-in. sheet of paper's length and $\frac{7}{16}$-in. increase with the grain.

With close atmospheric control, there is minimum stretching or shrinkage of paper, minimum trouble with variations in consistency of ink, uniformity of roller diameters and clean plates, as well as reliable employee service.

The air conditioning system consists of three 15-hp. refrigerating machines, a bank of filters, cooling and heating coils and a 10-hp. fan, which maintain 70 deg. temperature and 45 per cent relative humidity throughout a 20,000-sq.ft. area with a 12-ft. ceiling height.

Outside weather has no material effect on internal operations. Quality of product and employee efficiency is maintained by the absence of dirt and maintenance of ideal working conditions.

Light, Right Where It Is Needed

Sliding lighting units provide illumination for a 60-ft. assembly line in the plant of York Ice Machinery Corp., York, Pa. Fourteen units are mounted on an "electrical runway", eight on one side of the assembly line and six on the other side. Each unit consists of an angle reflector and a 200-watt lamp, and is approximately 5 ft. from the work. They can be moved parallel to the assembly line and can be arranged in any desired position. Greater light intensity is furnished for operations on the window-size air conditioning units as they are advanced along the assembly line.

"FLEXIBLE" LIGHTING — Increased illumination is obtainable at any one spot by the use of lighting units which can be moved along both sides of the assembly line.

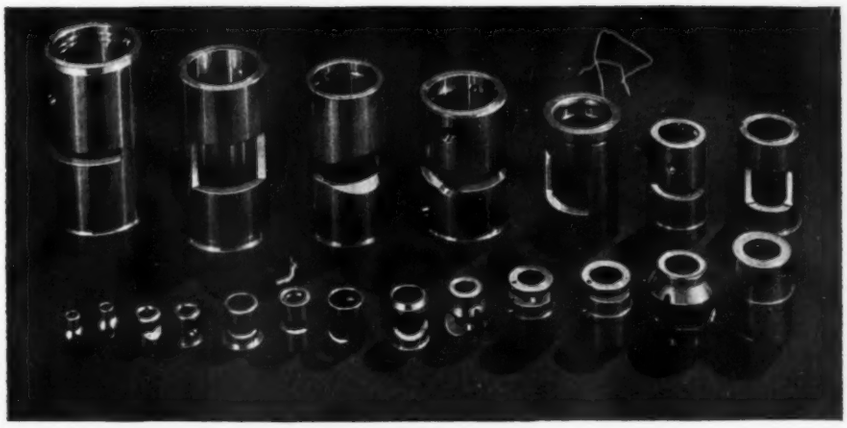
Additional illumination is provided by four overhead lighting units, each consisting of a 300-watt lamp and white reflector, mounted approximately 8 ft. from the work.

Note that the operator in the foreground is using a portable tool suspended to reduce assembly motions.

Uniform Quality With Uniform Heat

By the use of electric air drawing furnaces, production efficiency has been increased in tempering bolts, cutters, screws and small tools at the Pratt and Whitney division of Niles-Bement-Pond in Hartford, Conn.

Because results were so satisfactory after several years of operation of one 45-kw. General Electric furnace, a second unit of the same make and rating was installed. The furnace chamber



● Save valuable time for yourself and your customer by servicing motors with Bunting Bronze Bearings. Available from stock for all makes of motors from 1/50 hp to 100 hp. Write for the new catalog . . . The Bunting Brass & Bronze Company, Toledo, Ohio. Warehouses in All Principal Cities.

BUNTING

BRONZE BUSHINGS
PRECISION BRONZE BARS
BEARINGS
BABBITT METALS

This motor ran under water for several months at the showrooms of Electric Maintenance Company, 79-81 India St., Boston, Massachusetts

JOHN C. DOLPH CO.

Insulating Varnish Specialists

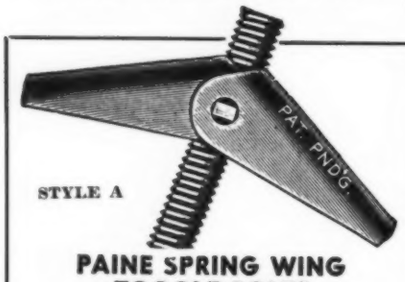
168-A Emmett St. Newark, N. J.

PAINE ANCHORS

GIVE GREATER SECURITY TO ALL INSTALLATIONS

•

SLASH TIME AND LABOR COSTS



STYLE A

PAINE SPRING WING TOGGLE BOLTS

PAINE Spring Wing Toggle Bolts are easier to install—have unusual holding strength and provide the best anchorage for all types of electrical equipment in hollow walls and ceilings. The wings are easily compressed and automatically spring to an anchoring position when slipped through bolt hole. Cadmium plated to resist rust and corrosion. PAINE Spring Wing Toggle Bolts are low in cost and are furnished in any length or style to meet your requirements. PAINE Button Head "Mushroom" Spring Wing Toggle Bolts are exceptionally efficient for anchoring the smaller Fluorescent Fixtures in existing buildings.

PAINE LEAD ANCHORS

PAINE Extra Strength Lead Anchors make installations in Brick, Marble, Cement and Stone Walls or ceilings simple and easy. In addition, they can be used with utmost safety in fragile material. Their advanced design and rugged construction—from a special lead mix—assure a secure anchorage that prevents movement in any direction.

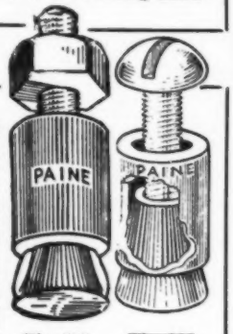


Fig. 910 Fig. 900

Fig. 950

PAINE WOODSCREW ANCHORS

An exceptionally strong and durable anchor, especially designed to provide greater holding strength inside as well as outside. The inside of the anchor is specially constructed to allow the wood screw to cut its own deep, positive thread. The gripping shield is designed to assure extra gripping capacity on the entire depth and circumference of hole.

•

Ask your Supplier TODAY for these PAINE Products also Machine Bolt Shields, Outlet Box Hangers, Romex Strap, Switch Boxes, PAINE Hand and "Sudden Depth" Carboloy Rotary Drills. Our complete Catalog will be sent FREE upon request.

THE PAINE CO.

2961 CARROLL AVE. CHICAGO, ILL.

New York Warehouse & Sales: 48 Warren St.

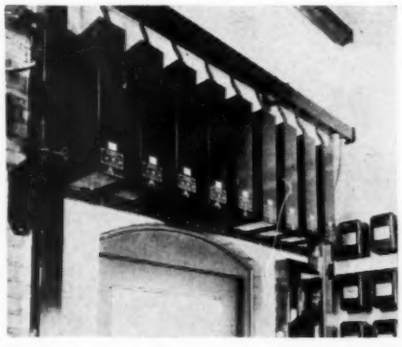
is 26-in. deep and 22-in. in diameter. Leeds and Northrup "Micromax" control is used. The control provides a permanent record of temperature and time relations.

Ordinarily carbon and high-speed steel and tools are tempered in approximately two hours, with operating temperatures ranging between 500 and 1,200 deg. F., according to the work.

Small work of this kind packs closely, but forced draft provided by an electric fan insures uniform and rapid distribution of heat on a better basis than was permitted with the former horizontal type furnaces. With this method of heat treating, uniform quality is obtained in repeated production.

Power Factor Up 21 Per Cent

The Florence Dye Works of Woonsocket, R. I., had the problem of avoiding a penalty charge and reducing the demand charge due to a low power factor of 68 per cent. They installed nine



NINE CAPACITORS, 5 kva. each, mounted over the door of the switchboard room, cost $1,142, gave a ratio of saving to cost of 36.8 per cent.

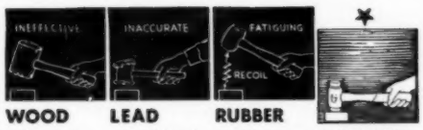
5-kva. capacitors; four on the main bus, three on a dye-kettle feeder, and two on the gill-room feeder.

RESULTS—New power factor 89 per cent, cutting demand charge and saving $420 per year.

Centralized Test Sets

Three motor-generator testing sets formerly in separate buildings were centralized in one location, adjacent to the plant air compressor, at the Blanchard Machine Co., Cambridge, Mass.

In the new location these units serve the present plant and are so related to future extensions that minimum investment in wiring and minimum energy losses in testing are assured. Setting up and testing are simplified, the chance



WOOD makes a clumsy tool that will split and crack.

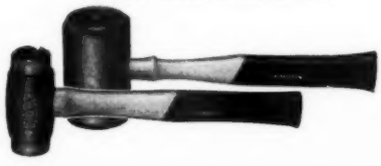
LEAD metal heads have edges that turn, break and fly off.

RUBBER makes a bouncing head that chips and smears.

RAWHIDE heads and faces stay accurate, absorb shock and wear longest.

★ **Chicago Rawhide Hammers and Mallets are the tools for striking hard accurate blows safely on any surface that must not be cracked, battered or marred. The tough Java Water Buffalo hide, coiled, compressed and treated for long life will not split, break or even dent, and has resilience to absorb rebound for easier, accurate blows.**

These hammers and mallets with genuine rawhide heads are quality tools for thrifty mechanics. Sold by industrial supply houses everywhere.



CHICAGO Rawhide MFG. CO.
1312 ELSTON AVE · CHICAGO · U·S·A·

For Better Service—

INSTALL **TRICO** REG. U.S. PAT. OFF.

RENEWABLE FUSES
With the famous Powder-Packed Element

KLIPLOK CLAMPS
Lock fuses and clips together

KANTARK FUSES
With genuine fibre tubes (not paper)

COLORTOP PLUG FUSES
The color tells the size

FUSE PULLERS
Pull and replace fuses safely

GLASS OILERS
For motors, line shafts, solid bearings etc

UNBREAKABLE OILERS
"Opto-Matic" Constant level type
Gravity Feed type

WRITE FOR FOLDER CPF-300

TRICO FUSE MFG. CO., Milwaukee, Wis.
In Canada: IRVING SMITH LIMITED, Montreal

of shutdowns is diminished by the concentration of facilities at one supervised point, and economical use of energy is made more certain.

The motor-generator sets consist of a 50-hp. General Electric and a 25-hp. Westinghouse layout; the drives being 550-volt a.c. motors, and the generators 220-volts d.c. for machine tool motor drive tests. A 3-hp. set furnishes 110-volts d.c. for testing. A switchboard nearby has facilities for instruments, with test circuit controls.

The 7-by-7-in. Ingersoll Rand compressor with an extended belt drive was formerly located in the basement. By equipping it with a short belt drive, space was saved in the new location. A Rockwood drive with a 10-hp. 550-volt S.A. Woods Machine Co. induction motor enables the motor to maintain belt tension; the speeds of the motor and compressor pulleys being 1,200 and 300 r.p.m. respectively.

Shunt Field Troubles!

Here is a simple method which the maintenance man may use for locating faults in the field circuit of a d.c. shunt-wound motor. Only a test lamp is required on the job.

This step-by-step procedure covers open circuit trouble.

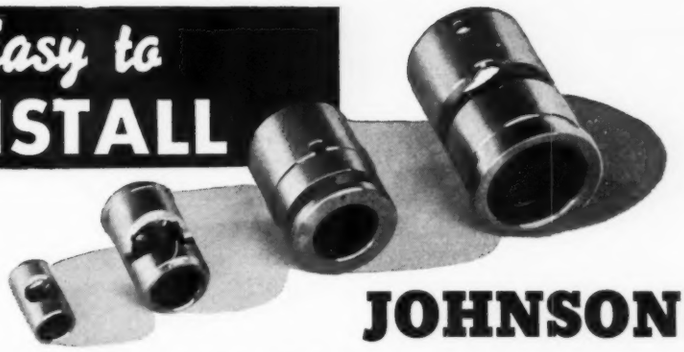
Open Circuit Trouble

A.—To determine if shunt field circuit is open—
1.—Maintain shunt field connections.
2.—Disconnect armature lead at starting box.
3.—Move starting arm to first running point.
4.—Allow starting handle to return to off position.
a—If spark occurs, shunt field circuit is closed.
b—If no spark occurs, shunt field circuit is open.

B.—To determine location of break in circuit—
1.—Maintain shunt field connections.
2.—Disconnect armature lead at starting box.
3.—Move starting arm to first running point.
4.—Connect test lamp to motor field terminals.
a—If lamp does not burn, check circuit outside of motor.
b—If lamp burns, shunt field circuit outside of motor is closed.

C.—To determine location of "open" in motor field—
1.—Inspect field coils for broken or loose connections.
2.—Maintain shunt field connections.
3.—Disconnect armature lead at starting box.
4.—Move starting arm to first running point.
5.—Connect one lead of test lamp to a motor field terminal.

Easy to INSTALL



JOHNSON
ELECTRIC MOTOR BEARINGS

Distributors Wanted

If you sell Electrical Supplies, investigate the profit possibilities in Johnson Electric Motor Bearings—No obligation.

● You eliminate expensive machining, costly delays when you install Johnson Electric Motor Bearings. Each bearing in this complete line comes to you ready for immediate installation. All oil grooves, slots, holes are correctly installed. You simply slip the bearing into the housing or over the shaft — and you are ready to go. Johnson Bearings are cast in a special high lead bronze to insure the maximum performance. This eliminates frequent replacement. Write for our complete catalogue — Today.

JOHNSON BRONZE
Sleeve BEARING HEADQUARTERS
490 S. MILL STREET · NEW CASTLE, PA.

CARBON BRUSHES
for
Refrigerator • Washer
Fan • Vacuum Cleaner
and Other Small Motors

Helping You Keep FAITH
WITH the trade you serve . . .

FOR brush replacements, SUPERIOR CARBON BRUSHES give you sure performance . . . for they are made specifically for the exact motors to be served . . . recognized for their superiority throughout the trade.

All That The Name Implies
SUPERIOR
CARBON SCP PRODUCTS, INC.
9115 George Ave. Cleveland, Ohio

for FRACTIONAL HORSE-POWER MOTORS
ALSO FOR OTHER CLASSES OF MOTORS

Don't Spend Hours Chiseling Holes in Concrete!

DRILL HOLES 50-75% FASTER!

Amazing new drill-point contains special metal harder than hardest steel. Goes through concrete, tile, slate, porcelain, etc., 50 to 75% faster. Drills cleaner, more accurate holes. Speeds up installation of expansion anchors. Saves your skilled time for more profitable work. Eliminates noisy hammering, monotonous chiseling. Doesn't splinter fragile work. No special equipment needed—use in any rotary drill. Get your share of those extra profits now possible. Send coupon for leaflet.

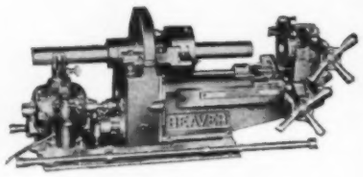
CARBOLOY COMPANY, INC.
DETROIT, MICHIGAN

FREE LEAFLET

Carboloy Co., Inc.
11135 E. 8 Mile St., Detroit
Send free leaflet on Carboloy Masonry Drill-Points, for drilling 75% faster.
Name
Company
Street
City State

CARBOLOY
MASONRY DRILL-POINTS

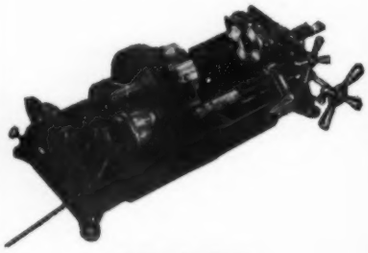
The A-B-C of . . .
Pipe Machines!



Model-A

A high-speed heavy-duty deluxe Pipe and Bolt Machine. Range ⅛-inch to 2-inch-up to 12-inch with geared tools and drive shaft. Bolts, ¼ to 2-inch. Wt. 415 lbs.

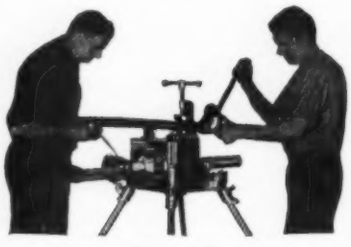
From $309.50 up
Write for Bulletin A



Model-B

A light-weight utility Pipe and Bolt Machine combining many features of Model-A with the easy portability of Model-C. Range ⅛ to 2-inch-up to 8-inch with drive shaft and geared tools. Bolts up to 1⅛-inch. Weight 280 lbs.

From $217.50 up
Write for Bulletin B



Model-C

Converts Hand Pipe Tools into Power Tools from ⅛ to 8-inches. Threads 8-inch in 6 minutes. Threads bolts up to 1½-inch. Equipped with automatic chuck wrench ejector—a safety feature. Two men can use it at the same time without interference. Easily portable—weighs about 150 lbs.

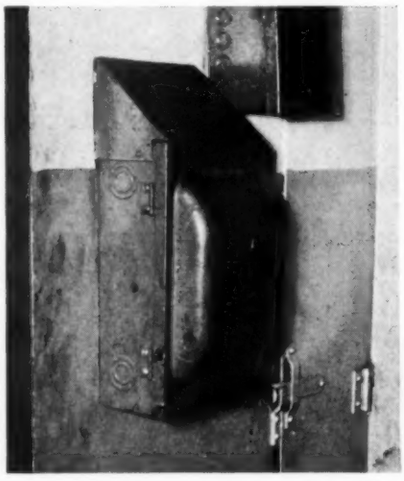
From $125.00 up
Write for Bulletin C

BEAVER PIPE TOOLS
740 Deen Ave. Warren, O.

6.—Connect other lamp lead to field coil terminal between poles 1 and 2, then 2 and 3, and so on.
a—If lamp does not burn, field circuit is closed.
b—If lamp burns, field circuit is open.

Protective Hoods

The electrical maintenance department of a large New York cafeteria chain builds protective hoods on all exposed electrical switches, controls, and cabinets in their stores. This prevents the employees from using the equipment as convenient shelves for soap, wet cloths and other articles. It reduces the number of maintenance calls and saves money.



PROTECTIVE HOODS prevent the use of the tops of electrical equipment as shelf space

Electric Outlets Made Accessible

To facilitate the use of electric equipment such as portable electric tools, electric soldering irons, screw drivers, bench grinders and portable lights, many shops and plants have installed mold or strip wiring.

These types of wiring can be installed in new or old buildings, or on work tables or benches. They provide for assembly of a number of electric outlets at one place or for addition of outlets as needed.

Accessibility of the outlets makes it possible to use electric tools that help reduce costs and speed up production, and to plug-in and use the tools at the place where they are needed.

50% TO 75% FASTER DRILLING IN CONCRETE—BRICK, etc.
AND OTHER MASONRY MATERIALS

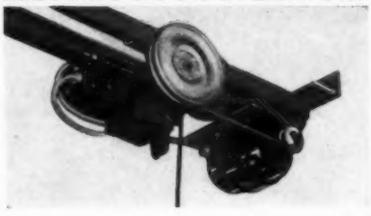
CUT DRILLING COSTS with SUPER CARBIDE TIPPED DRILLS

- Straight, true holes without damage to costly building materials.
- Many more holes per grind — and many more holes per tool.
- Rapid installation of expansion shields due to clean holes of correct size.
- Drill in occupied buildings without noise.

Write to

SUPER TOOL COMPANY
21650 Hoover Road Detroit, Mich.

MAKE MORE PROFITS WITH ELECTRIC DOOR OPERATORS



See our Ad, Page 168 of 1940 Electrical Buyers Reference

DOORS and OPERATORS, Inc.
Tiffin, Ohio 528 Hudson St.

NEW SpeedWay Not only far more for the money — actually more drill.

A tool and a price made possible by SpeedWay's 30 years' specialization in portable electric tools, and modern production methods. Every new feature: Streamlined, die cast case, forced air cooling, natural grip in line breast plate handle, removable side handle, sliding switch, waterproof cord, molded plug, and a stallproof specially wound, high torque, 500 RPM, 115 V Universal SpeedWay Drill Motor.

If your dealer can't supply, order direct on 10 day trial.

1" DRILL 2-4 $24.50

Circular Free

SpeedWay Mfg. Co., 1866 S. 52nd Ave., Cicero, Ill.

Estimating

MODERNIZATION IN A LARGE HOUSE

During the modernization and renovation of a three story, 23 room house with a four car garage in Elmsford, N. Y., additional electrical outlets were installed for new fixtures, appliances and ranges. The house was of frame construction with wood lath and plaster walls and ceilings.

The electrical contractor on the job kept the following record of the time required to make the installation.

MAIN SERVICE—includes the installation of a 100-ampere, 110/220-volt, single phase, three-wire service complete with meter equipment all mounted on a new wood meterboard, and service feeders which consisted of three No. 1 r.c. wires in 1½-inch conduit.
Total time .....14 m. h.

DISTRIBUTION PANEL—includes the installation of a subfeeder consisting of 25 feet of 1-inch conduit with three No. 8 r.c. wires and a 12-circuit No-Fuse lighting distribution panel mounted on a new wood back board fastened to the stone foundation wall.
Total time .....9 m. h.

CONNECTING ELECTRIC RANGES—includes wiring and connecting two electric ranges located 20 feet from the distribution center. An 11 kw. range circuit consisted of No. 6, 3-conductor BX cable. No. 8, 3-conductor BX was used to feed a 9.5 kw. range.
Total time .....7 m. h.

CONNECTING MOTORS—includes wiring and connecting one ¼ hp. oil burner motor with No. 14, 2-wire BX, 20 feet from the distribution center. Also the wiring and connecting of one ½ hp. artesian well motor with two No. 14 r.c. wires in ½-inch conduit, 15-feet from the distribution center.
Total time .....7 m. h.

WIRING OUTLETS—includes the installation of approximately 900 feet of No. 14, 2-wire BX; also the mounting and connecting of 34 switch, ceiling and receptacle outlets. Wherever possible the BX was fished through the walls and ceilings.
Total time .....27 m. h.
Average time per outlet.....0.797 m. h.

HANGING FIXTURES—includes the mounting and connecting of 47 fixtures throughout the house.
Total time .....12 m. h.
Average time per fixture.....0.255 m. h.

OVERHEAD GARAGE SERVICE—includes the installation of an overhead service consisting of two No. 10 conductors from the distribution panel in the basement of the house to the garage 75 feet away. This includes the conduit service exit at the house and the conduit service entrance at the garage; also the installation of an entrance switch and a driven ground electrode at the garage.
Total time .....7 m. h.

DRIVEWAY LIGHT—includes the installation of three No. 14 lead covered cables in 25 feet of existing underground conduit to a reflector mounted on a cedar post located at the main driveway between the house and garage; also the mounting and connecting of two 3-way switches, one in the house and the other in a weatherproof fitting on the lamp post.
Total time .....7 m. h.

The above figures do not include supervisory labor on the job. *Data from Lawrence Electric Co., Yonkers, N. Y.*

MAIN FEEDER INSTALLATION

The main feeders to a bus distribution system in a New Jersey manufacturing plant were run in conduit from the secondary switchboard to a large pull box in the center of the main duct run. Two 1000-ampere, three phase, four wire, 120/208 volt feeders consisting of two 750,000 CM rubber covered cables per phase leg and two No. 4/0 rubber covered cables per neutral leg were run in four 4-inch galvanized conduits. Each conduit contained 3—750,000 CM and 1—4/0 cables. The building was of brick, glass and steel construction. A high monitor over the main duct line necessitated the use of trapeze type channel iron conduit hangers supported by two ½-inch bolt rods, 12-feet long and fastened to the monitor roof steel by "C" clamps. The supports on the low steel and over the switchboard were 12 inches long.

An accurate check on the labor required for the feeder installation was kept by the contractor for future reference.

The following is the labor breakdown together with a list of the material installed.

MATERIAL INSTALLED

4—3-inch channel iron and ½-inch bolt rod trapeze type hangers, 12-inches long.
2—3-inch channel iron and ½-inch bolt rod trapeze type hangers, 12-feet long.
2—3-inch channel iron and ½-inch bolt rod trapeze type hangers, 14-feet long, for the pull box in the main duct run.
1—No 10 gauge steel pull box, 4-ft. by 2½-ft. by 2½-ft.
200 feet—4-inch galvanized conduit.
4—4-inch galvanized conduit elbows.
696 feet—750,000 CM rubber covered cable.
232 feet—No. 4/0 rubber covered cable.
24—750,000 CM solderless lugs.
8—No. 4/0 solderless lugs.

LABOR NECESSARY TO INSTALL THE ABOVE MATERIAL.

FABRICATING SMALL CONDUIT HANGERS—includes measuring, cutting, drilling, assembling and mounting the four 12-inch trapeze type hangers to support the conduit on the low steel and over the switchboard.
Total time ..... 6 m. h.
Average time per hanger..... 1.5 m. h.

FABRICATING LARGE CONDUIT HANGERS—includes measuring, cutting, drilling, assembling and mounting the two 12-foot trapeze type conduit hangers in the high monitor.
Total time ..... 8 m. h.
Average time per hanger..... 4 m. h.

LARGE PULL BOX AND SUPPORTS—includes measuring, cutting, drilling, assembling and mounting two 14-foot trapeze type hangers for the pull box in the high monitor; also mounting the pull box.
Total time ..... 9 m. h.

LAYOUT OF PULL BOX—includes making templates of the pull box for the entrance of the bus duct runs.
Total time ..... 2.25 m. h.

CUTTING KNOCKOUTS—includes cutting four holes, with an acetylene torch, in the top of the pull box over the switchboard for the entrance of the four 4-inch conduits.
Total time ..... 0.75 m. h.
Average time per hole..... 0.1875 m. h.

NEVER TOO BUSY to help out, is N. Robert Wilson, estimator and engineer of the Sterns Electric Equipment Co., Buffalo, N. Y. In addition to his contracting work, Bob has his own engineering practice and recently captained his electrical "accounts" to a financial victory in the Buffalo Joint Charities Campaign.

TIME is your Partner in Profits

When you save Time in electrical installation, it becomes an important Partner in profits. This partner becomes especially important when Time Estimates are cut as a result of short cuts through adoption of modern methods . . . When you use Burndy Connectors you may be sure that Time, your partner in profit is working with you.

CONSULT YOUR WHOLESALER FOR DETAILS ON THIS ITEM

BURNDY qiklug

Estimating

[FROM PAGE 51]

INSTALLING CONDUIT — includes measuring, making eight cuts, assembling four elbows and mounting the four 50-foot runs of 4-inch conduit.

Total time	29	m. h.
Average time per foot	0.145	m. h.

PULLING WIRE — includes setting up the rigging consisting of two snatch blocks and a column mounted winch; setting up the reels of wire which came cut to length on the reel and pulling in 12—58-foot lengths of 750,000 CM and 4—58-foot lengths of No. 4/0 rubber covered cables in the four 4-inch conduits.

Total time	23.5	m. h.

CONNECTING TO BUSES—includes fanning out, phasing out and making 32 connections with solderless lugs to all buses at both the switchboard and duct ends of the feeders, including necessary taping.

Total time	28	m. h.
Average time per connection	0.875	m. h.
Total time for entire job	106.5	m. h.
Supervisory labor on job (included in above units)	24	m. h.

Data from Garden Electric Co., Inc., Elizabeth, N. J.

USING SMALL DIAMETER WIRE

A contractor in Rochester, N. Y., recently did a rewiring job in a large clothing store where he had to use the new small diameter wire to get the necessary increased capacity. Structural conditions were such that running exposed conduit or metal molding around deep beams would have made an unsightly job. So he decided to use Flamenol small diameter building wire in the existing concealed conduits. Additional lighting distribution panels were necessary for the increased load.

The following are the labor figures he kept on the wire pulling operation:

PULLING OUT OLD WIRE—includes cutting present connections and pulling out the existing rubber covered wire to make way for the new wire.

Total time	24 m. h.

PULLING IN NEW WIRE—includes installation of approximately 5,000 feet of No. 10 and 12 small diameter Flamenol building wire in the existing conduits.

Total time	24 m. h.

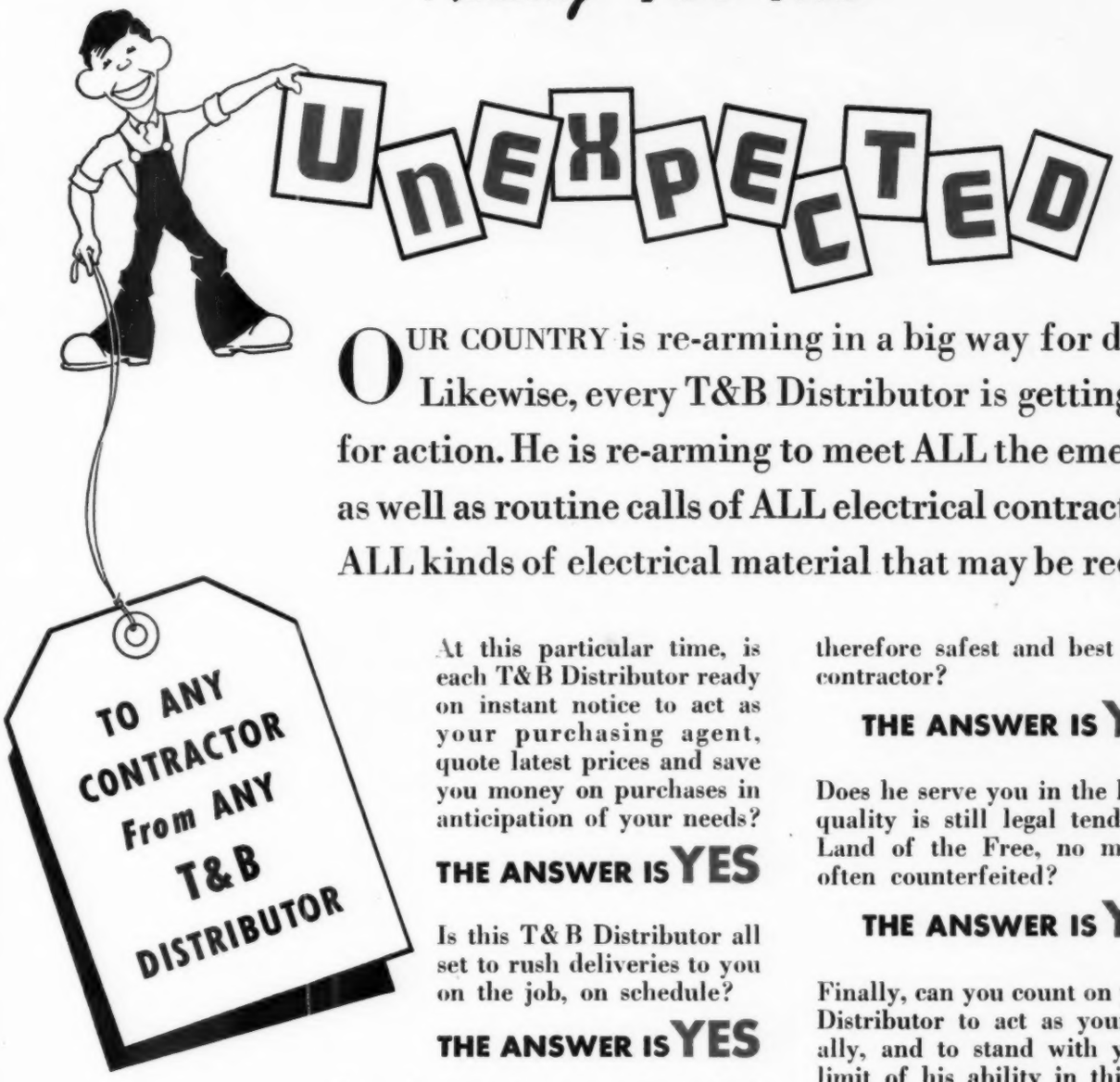
INSTALLING NEW PANELS—includes removing the old lighting panels and replacing them with new ones in the existing cabinets and making all circuit connections to the branch circuit switches in the panel.

Average time for a 36 circuit switch and fuse type panel	10 m. h.

No supervisory labor is included in the above figures.

Data from Hickson Electric & Radio Corp., Rochester, N. Y.

Ready For The



OUR COUNTRY is re-arming in a big way for defense. Likewise, every T&B Distributor is getting ready for action. He is re-arming to meet ALL the emergency as well as routine calls of ALL electrical contractors for ALL kinds of electrical material that may be required.

At this particular time, is each T&B Distributor ready on instant notice to act as your purchasing agent, quote latest prices and save you money on purchases in anticipation of your needs?

THE ANSWER IS YES

Is this T&B Distributor all set to rush deliveries to you on the job, on schedule?

THE ANSWER IS YES

Does he specialize in trade-marked, standard products which are safest and best for the public welfare, and therefore safest and best for every contractor?

THE ANSWER IS YES

Does he serve you in the belief that quality is still legal tender in this Land of the Free, no matter how often counterfeited?

THE ANSWER IS YES

Finally, can you count on your T&B Distributor to act as your business ally, and to stand with you to the limit of his ability in this national emergency?

THE ANSWER IS YES

The Thomas & Betts Company has been engineering and manufacturing electrical fittings for the past 40 years. Contractors know the name and the trade-mark. They also know that the only way they can buy T&B trade-marked products is from authorized T&B Distributors. They cover the country. They are "Ready for the Unexpected." Enlist their services!

THE THOMAS AND BETTS CO., INC.

Factory, Engineering and Executive Offices, Elizabeth, N. J.

Questions ON THE Code

Answered by
F. N. M. SQUIRES
Chief Inspector New York Board of Fire Underwriters

Service Entrance Conductors

"We have about 100 Government houses which are soon to be changed from 60-amp. to 100-amp. services. We may use rigid conduit and rubber-covered wires, or we may use armored service entrance cable for the service entrance conductors.

"The argument that has arisen over this is as follows:—From 1937 NEC, page 36, Section 2305 and page 262, Chapter 9, table 1, I contend that No. 1 R.C. wire must be used (assume 100-amp. load in single family dwelling) if R.C. wire is to be used. The Government warehouse department has been unable to find armored service entrance cable in larger than No. 2 wire, and say that manufacturers claim it is large enough for 100-amps.—D.S.P."

Q. *1. "Does not armored service entrance cable of a given size have the same carrying capacity as R.C. wire of that size?"*

A. 1. Under the 1937 Code No. 1 R.C. wire has an allowable current carrying capacity of 100-amps. and no more. No. 2 R.C. wire has a carrying capacity of 90-amps. This, however, for the No. 2 wire is an over rating as has been proved by investigation and the carrying capacity should not be over 80-amps. This 80-amps. will be the allowable carrying capacity for the No. 2 wires (3 in a cable or in a conduit) under the 1940 Code which will become effective November 1, 1940.

If the specifications call for a service with 100-amps. carrying capacity, the No. 2 service entrance cable would not meet the specifications unless the rubber insulation is of the heat-resistant grade (Type RH) in which case the carrying capacity would be 115-amperes. Even if the No. 1 cable were obtainable it should not carry 100-amps. unless the rubber insulation is of the performance (Type RP) or heat-resistant (Type RH) grade. (See 1940 Code table below.)

Evidently, therefore, the requirement will be for the use of conduit with No. 0 if of Type R insulation or No. 1 if of Type RP insulation or No. 2 if of Type RH grade.

The 1940 Code will give the following capacities:—

Wire Size	*1 condr. free in air*		
	R	*RP*	*RH*
No. 2	118-amp.	142-amp.	170-amp.
No. 1	136-amp.	164-amp.	196-amp.
No. 0	160-amp.	193-amp.	230-amp.
Wire Size	*In conduit or cable, 1, 2 or 3 wire*		
	R	*RP*	*RH*
No. 2	80-amp.	96-amp.	115-amp.
No. 1	91-amp.	110-amp.	131-amp.
No. 0	105-amp.	127-amp.	151-amp.

These values should not be used prior to November 1st, 1940, except by permission of the inspection authority having jurisdiction.

***NEW PRESIDENT** — Grover Grider, once mayor of Stockton, Calif., (right) became the new president of the Electrical Contractors Assn. of Northern California at its annual meeting not long ago. Ken Ryals (left) of San Francisco, retiring president, congratulates him. Grider is also president of the Stockton association and active in civic and fraternal affairs.*

Q. *2. "Should not No. 1 R.C. wire be used for 100-amp. load or 100-amp. switch?"*

A. 2. The load in amperes and not the size of the switch should govern the size of wire used. If the load is 100 amperes the wires should be at least No. 1 (1937 Code). But if the load is, for instance, only 80 amperes, then No. 2 wire could be used even though a 100-ampere switch is used.

The load should be determined either by computation in accordance with Section 2202 or the actual load (when known) whichever is the larger. However, even if the load is less than 100-amps. and the specifications do call for a 100-amp. service, then the wires should not be smaller than No. 1.

Q. *3. "Does the armor of BX constitute a proper ground for a range if properly made up in all joints from range to service ground?"*

A. 3. Yes. This, of course, provided the cable is approved by the Underwriters' and provided the metal strip of which the armor is made is of proper gauge metal. On some cables the armor was for a while running a little under gauge but the Laboratories are insisting that the manufacturers correct this.

Q. *4. "Is it permissible to use a 440-volt, 60-amp. switch as a 220-volt, 60-amp. service entrance switch? I contend that it is not."*

A. 4. Yes. If a switch will successfully handle 60-amperes at 440-volts, or 26,400-watts it certainly should also successfully handle 60-amperes at 220-volts, or 13,200-watts.

If this is a fused switch, it would also be satisfactory as the higher voltage fuses would also operate successfully on the lower voltage. Sub-paragraph b of Section 2461 indicates this as it prohibits the use of a fuse holder of lower ampere rating than the fuse, or of a higher voltage rating than the fuse, but does not prohibit the use of the fuse holder of lower voltage rating than the fuse.

Grounding Lathes

Q. *"Our State Industrial Inspector came to my place of employment a couple of weeks ago. We have eight (8) wood lathes similar to that sketched below and he ordered these all grounded. My contention is, inasmuch as the power supply for this building is run in conduit throughout with-*

EVERY OUTLET DESERVES

A **BRYANT** DEVICE

Attachment PLUG CAPS

These are the little fellows in the Wiring Device Family. But simple as they may appear, it takes plenty of skill to make them dependable and at the same time inexpensive. Take the standard Bryant bakelite cap. It has 9 separate parts and requires 26 distinct operations in the Bryant plant. It's packed, shipped and delivered for only a fraction of a nickel. You can match the price but you can't beat the value . . . an important quality of all Bryant and Hemco Superior Wiring Devices.

BRYANT

SUPERIOR WIRING DEVICES

The Bryant Electric Company
Bridgeport, Connecticut

ADEQUATE WIRING SERVES AND SAVES

SOLD THROUGH ELECTRICAL WHOLESALERS NATIONALLY

THERE IS A **BRYANT** DEVICE FOR EVERY WIRING NEED

FOUR POINT ECONOMY—

Above: Type CFT, three-phase, outdoor-type, air-cooled, general-purpose transformer.

Below: Type CF, Single-phase, outdoor-type, air-cooled, general-purpose transformer.

1 LOW INITIAL INVESTMENT

2 EASY TO INSTALL

3 MINIMUM MAINTENANCE

4 EFFICIENT IN OPERATION

Whenever it is desired to obtain a low-voltage supply from a higher voltage circuit you will find AmerTran Type "CF" Air-Cooled Transformers both economical and convenient to use. These moderately priced units may be installed wherever they are needed—either outdoors or indoors*—without the necessity of oil, fire-proof vaults or enclosures. All sizes are equipped with either conduit fittings or a built-in junction box to facilitate installation, and both single-phase and polyphase types are furnished as a single unit. Available in capacities up to 100 Kva. and for potentials up to 2400 volts, all ratings offer low initial investment, minimum installation and maintenance expense, and low operating cost. Let us send data on equipment to meet your needs. Ask for bulletin 1116A.

* Units rated 15 Kva. and larger for indoor service only.

Type "CF" Applications

1. Stepping down power circuit voltage to 115/230 volts for lights, small motors or heating elements. In this way advantage may be taken of lower power rates for low-voltage loads.
2. Obtaining a 3-wire circuit from a 2-wire system.
3. Changing from 3 phase to 2 phase, or vice versa, on a power system.
4. Obtaining low voltage for heating, welding, 32-volt tools, special lighting, testing, etc.
5. Balancing load on 3-phase systems.
6. Insulating one circuit from another.
7. Distributing power at 600 volts or less.
8. Reducing light flicker.
9. Obtaining special voltages to permit efficient operation of equipment.

AMERICAN TRANSFORMER COMPANY

178 Emmet St. Newark, N. J.

PRODUCTS

American Transformer Co. manufactures transformers for every industrial, electronic and laboratory application in sizes up to 10,000 Kva and for potentials up to 132 Kv. Other products: voltage regulators, test sets, rectifiers.

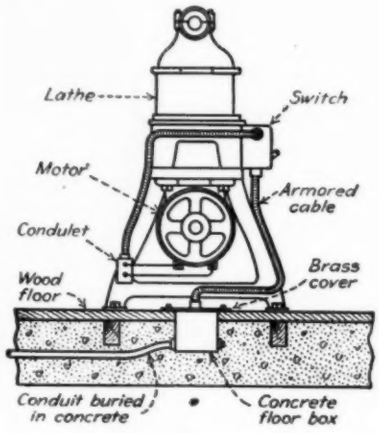
AMERTRAN TRANSFORMERS

Manufactured Since 1901 at Newark, N. J.

Questions on the Code

[FROM PAGE 54]

out a break, only at the motor terminals, that these lathes are grounded good enough to pass Code. All conduits are run in concrete to floor outlets. Please give me your opinion on this."—J.H.B.



A. The grounding of the motor and the lathe frame to which it is attached is dependent upon the cover of the floor box to which the armored cable running from this box to the motor controller, is attached. The motor is then grounded only through the armor of the cable and the lathe frame.

Anytime that the cover of the floor box was removed, or loosened, the motor and the lathe frame would not be effectually grounded. Even if the armored cable were connected permanently to the side of the floor box instead of to a removable cover, the armor of the cable would be a poor ground.

Therefore, taking all points into consideration, the motor should be effectually grounded to the conduit system in this case, preferably by means of a separate grounding connection.

Service Entrance

Q. *"What is the proper way to install a 115-230 volt a.c. service entrance ground, using outdoor meter? The dwelling sets on a solid rock with only a foot of earth over the rock, no well or such is in reach."—G.C.P.*

A. If there is no water or other metallic piping leading underground to the building, the grounding connection should be made to an electrode, such as, a full length of galvanized conduit, buried in a horizontal trench and should not be less than eight feet in length.

APPLETON ELECTRIC PRODUCTS
"REG. U. S. PAT. OFF."

APPLETON

SAVES YOU TIME AND MONEY

When you, Mr. Contractor, *standardize on APPLETON PRODUCTS for every job*, you simplify your operations, reduce your inventory investment, get faster work out of your men, give your customers the utmost in safety. There is an APPLETON product to fit all your roughing-in needs.

Ask your wholesaler for catalogs and prices

APPLETON ELECTRIC COMPANY

1701-1729 WELLINGTON AVENUE CHICAGO, ILLINOIS

Branch Offices: **NEW YORK, 76 Ninth Avenue • DETROIT, 7310 Woodward Avenue • CLEVELAND, 214 Hippodrome Bldg. • SAN FRANCISCO, 655 Minna Street • ST. LOUIS, 420 Frisco Bldg. LOS ANGELES, 100 North Santa Fe Avenue • ATLANTA, 203 Luckie Street, N. W.**

Resident Representatives: ***Baltimore, Birmingham, Boston, Cincinnati, Dallas, Denver, Kansas City, Milwaukee, Minneapolis, New Haven, Philadelphia, Pittsburgh, Seattle***

CONDUIT FITTINGS • OUTLET & SWITCH BOXES • EXPLOSION PROOF FITTINGS • REELITES

In the News

NEW YORK CONTRACTORS MEET AT LAKE PLACID

The New York State Association of Electrical Contractors and Dealers held their 41st annual convention at the Lake Placid Club, Lake Placid, N. Y., June 17 to 20.

The program was divided into four morning sessions while the afternoons and evenings were devoted to sports and entertainment. Monday was Manufacturers and Wholesalers Day with opening addresses by E. G. May and Elmer A. Jones, chairman of the day. Karl Staley, General Electric Co., told the story of fluorescent light while Howard Weber, U. S. Rubber Co., outlined "Contractor Markets for New Wires". Fred S. Kinsey, Westinghouse Lamp Division, discussed "The Challenge of Lighting" and Leo Meagher, Gould-Farmer Co., spoke about "The Distributors Place in the Picture". E. C. Brown, Jr. was convention chairman.

Tuesday was Contractors Day. A. Lincoln Bush, chairman of the day, made the opening address. James D. Lynett suggested the enactment of a city sales ordinance and the cooperation of manufacturers to stop the sale of sub-standard electrical material. R. W. McChesney gave a very interesting talk on the subject "Is The Electrical Contractor Human?" D. B. Clayton outlined what his NECA committee is doing to set up a sales development course for the association members. George Andrae reviewed the new wires, capacities and other Code changes and strongly stressed standardization on the 75 deg. C wire, galvanized conduit and boxes and the elimination of large circular mil cables. He also stated that Underwriters labeling service would be available to manufacturers of type RU wire July 1 and type SN wire August 15.

Herman L. Weisman, former assistant attorney general, State of New York, in his paper on "Government vs. Trade Associations" reviewed the background of the Sherman Anti-Trust Law and application in the prosecution of the building trades. He suggested a program whereby contractors associations could combat what they term unjustified prosecution. Paul Ferneding, Supt. N. Y. Board of Fire Underwriters, spoke about the public relations program which his organization is fostering. W. L. Bliven, chief inspector, N. Y. Fire Insurance Rating Organization, expressed the willingness of his department to aid in helping inquiring contractors to interpret the new Code.

Wednesday was Utilities Day with Franklin S. Koons, acting as chairman of the day. James W. Carpenter debated C. Raymond Banes and Frederick Koop on the menace of the Discount or Catalog House. Fred J. Brown discussed "Vitamins for Business" while H. S. Bell talked about "Dealer Cooperation in Load Building."

During the business session on Thursday all officers and directors were re-elected.

INSPECTORS MEET IN ROCKFORD

The Illinois Chapter, Western Section, IAEI held its tenth mid-year meeting in Rockford, Illinois June 6 to 7. Harry J. Madson, of Winnetka presided.

Clarence A. Pottinger, president of the Rockford Electrical Contractors Association headed the program with an address on cooperation between contractors and inspectors, N. M. Thomson, Industrial Electrical Company of Chicago, discussed the wiring of gasoline pumps and L. A. Russ of Westinghouse outlined recent fluorescent lighting developments.

The inspector's problem session, under the guidance of V. H. Tousley, Electrical Field Engineer of NFPA, heard discussions by J. E. Buckham, N. Mosser, L. E. Ewald, G. E. Manning and D. J. Talbot of Chicago and E. J. Brown of Milwaukee on various aspects of the inspector's work.

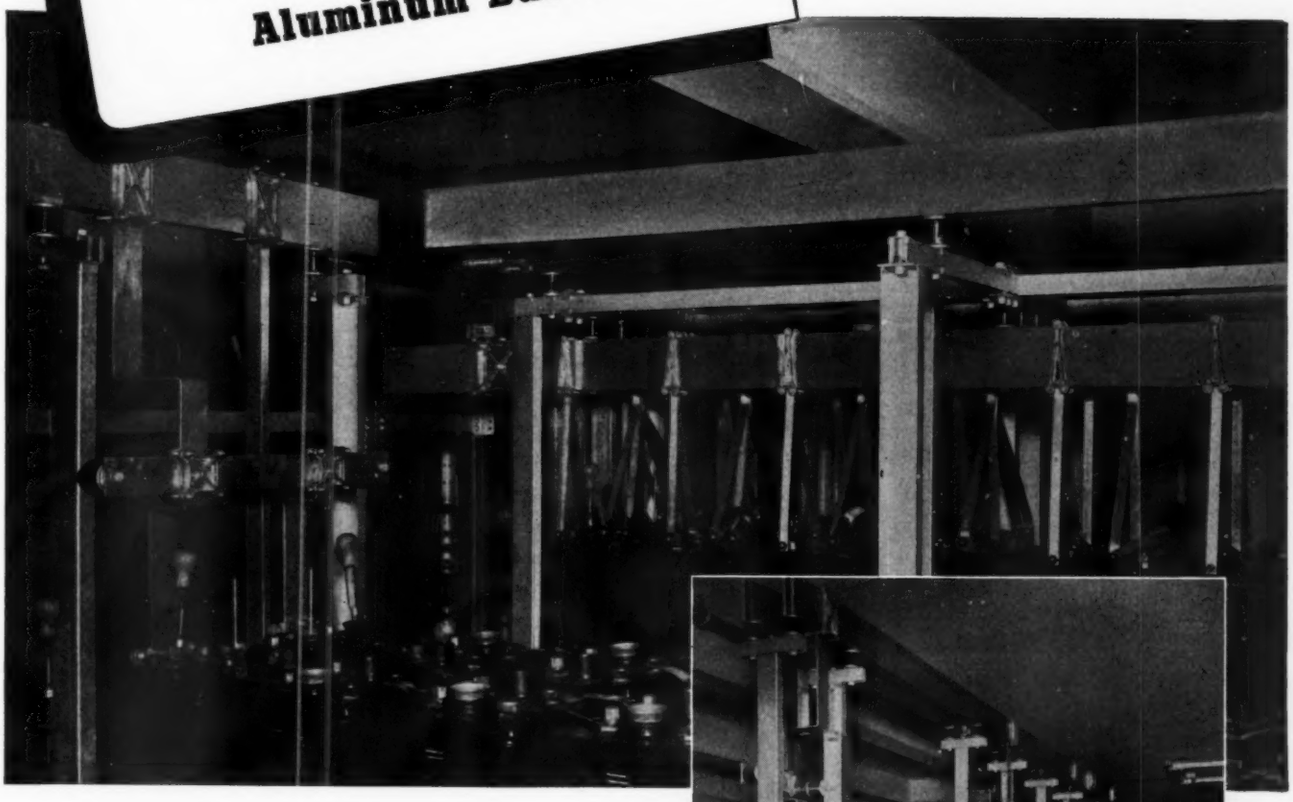
The following day's program included an address by A. D. Pettee of General Cable Corp. on rubber and rubber-like compounds, a description of wiring methods employed on electrical temperature control system by D. M. Lathers of the Barber-Colman Co., a discussion of rural inspection by Warren M. Sparks of Central Illinois Gas & Electric Co. and a moving picture of porcelain insulator making presented by E. G. Romeiser of Porcelain Products, Inc.

VANCOUVER ELECTRICAL ASSOCIATION MEETS

The annual meeting of the Vancouver Electrical Association was held at the Hotel Georgia, Vancouver, B. C. In addition to the regular association business and committee reports, representatives of the various branches of the electrical industry gave short addresses outlining their

"That electrician has everything connected up wrong!—When you pull this the light goes on!"

"here's what we like about Aluminum Buses"

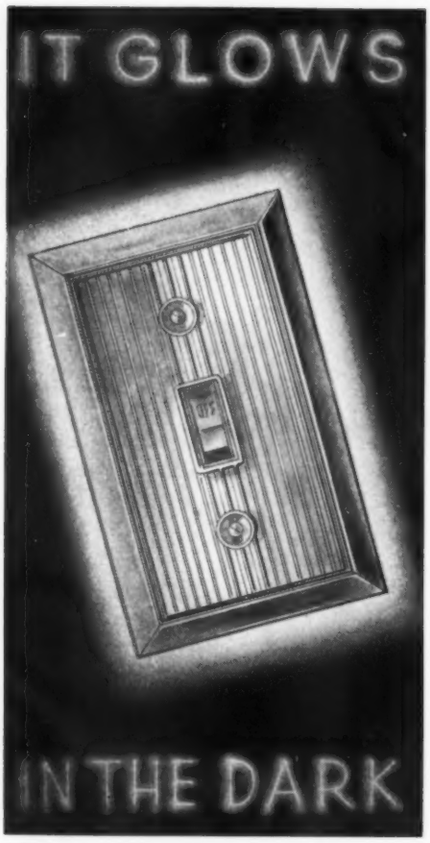


"Aluminum makes a neat looking installation that is easy to keep that way. Withstands the highly corrosive battery vapors, does not need the protection of paint. Aluminum provides the necessary conductivity. And because it is light in weight, floor loads are reduced."

That's just about the whole story on Aluminum Bus, whether it is flats, tubes, angles or channels. Standard, inexpensive fittings are available. Assembly is made by bolting or welding.

If you are planning a bus installation, ask our engineers what types and sizes of Alcoa Aluminum Bus they would recommend for the job. They'll quote you prices, too. Write ALUMINUM COMPANY OF AMERICA, 2197 Gulf Building, Pittsburgh, Pennsylvania.

Battery room installation of flat Alcoa Aluminum Bus Bar.



NEW Revolutionary Invention

No more fumbling in dark for the light-switch. No more dirty, finger-stained walls around the switch.

GLO-PLATES end all that. They give your customers a real convenience. Everyone who sees GLO-PLATES wants them.

GLO-PLATES are made of an amazing new plastic that actually stores up light. GLO-PLATES are not phosphorus treated nor radio active. They don't depend on light reflection. The darker the room, the brighter they glow.

GLO-PLATES will mean new profits for you. Show your customers these astonishing new plates. They have sold wherever they have been shown.

We want you to prove GLO-PLATES for yourself. Send the coupon below for a sample plate, prices, and full details.

NATIONAL PLASTICS, INC.
1003 Power Avenue Cleveland, Ohio

GLO-PLATE

COUPON

NATIONAL PLASTICS, INC.
1003 Power Avenue, Cleveland, Ohio

Send me a sample GLO-PLATE, prices and complete details:

☐ TOGGLE TYPE ☐ TWO BUTTON TYPE

Name.....

Company.....

Title.....

Address.....

City and State.....

Name of Elec. Jobber.....

In the News

[FROM PAGE 58]

specific industry problems and the relationship each has to the other.

The following association officers were elected for the coming year: president, Earle Dunsmuir, Dunsmuir Electric Co.; vice-president, George W. Firth, Jarvis-Firth Electric Co.; secretary, John S. Homersham, J. S. Homersham Co., treasurer, Robert Sutherland. Newly elected members of the executive board are: Harry Lucas, H. G. Wallace, Charles Longley, R. B. Gaskarth, Ralph Graham, J. D. Carmichael, T. Barwood and R. Hall.

COMING MEETINGS

Minnesota Electrical Council, Minnesota Electrical Association—Annual Summer Meeting, Hibbing, Minn., July 19–21.

International Association of Electrical Inspectors — Southwestern Section, Santa Barbara, Calif., August 26–30. Northwestern Section, Great Falls, Mont., Sept. 3–6. Southern Section, Houston, Texas, Sept. 16–20. Western Section, Kansas City, Mo., Sept. 23–27; Eastern Section, New York, N. Y., Oct. 7–11.

National Electrical Contractors Assn.—Annual Convention, George Washington Hotel, Jacksonville, Fla., Oct. 21–23.

National Electrical Manufacturers Assn.—Annual Conference, Waldorf-Astoria Hotel, New York, N. Y., Oct. 27 to Nov. 1.

JOINT MEETING IN SACRAMENTO

A joint meeting of the San Francisco Electrical Contractors' Association, the Electrical Contractors' Association of Northern California and the Northern California Chapter and Greater Central Valley Chapter of the I.A.E.I. was held in Sacramento June 15. Ralph W. Wiley, chief, department of electricity, San Francisco, and Harold I. Gerber, chief inspec-

HAPPY DELEGATES at the New York State Contractors convention at Lake Placid are Harry A. Hanft (left), S. J. O'Brien and Ralph Neumuller all of New York City. Ralph and S. J. took a prominent part in the contractors' evening entertainment.

The easiest way to get ahead in electricity—

through the other man's experience as found in books

Whatever "getting ahead" means to you as an individual, there is no principle so important as backing up your brain with the other man's experience. Why spend time and effort to find out what has already been learned and put down for all to see in books? Here, for instance, are all the results of a rich experience in every stage of wiring, installation and contracting work gathered and set down for you in

Terrell Croft's

AMERICAN ELECTRICIANS' LIBRARY

(6 volumes — over 2,000 pages — fully illustrated)

In six really magnificent volumes this library gives one of the most thorough, complete and easy-to-understand treatments of the more specialized phases of electrical practice in print today.

"How" and "why" for Maintenance Men

The books show the best ways to make installations for every type of conduit wiring job—they tell how to handle every kind of lighting and switch problem—they give tips on short-cuts for saving time on routine jobs—they show the quickest and surest methods of locating and remedying circuit troubles. Alternating current armature winding, electrical machinery control diagrams and machinery erection are some of the things covered in detail.

Diagrams

In all, these books contain more than 1,000 clear, easy to follow diagrams, with wiring instructions written in simple language. It is unnecessary to tell you how valuable is this one feature alone.

Small monthly payments

You may examine these books for 10 days by sending the coupon below, filled out. In addition, if you decide to keep the books you have the privilege of paying for them in easy monthly installments while you use the books. Make sure you are not passing up your best bet for getting ahead. Mail the coupon today.

EXAMINATION COUPON

McGraw-Hill Book Co., Inc.
330 W. 42nd St., New York, N. Y.

Send me Croft's American Electricians' Library, 6 volumes, for 10 days' free examination. If I find the books satisfactory, I will send you $1.50 in 10 days, and $2.00 a month until $17.50 has been paid. Otherwise I will return the books postpaid.

Signature .....

Address .....

City and State .....

Firm or Employer .....

Position .....E.C. 7-40

(Books sent on approval in U. S. and Canada only.)

The Little Man
Who's Always There
— in Quality,
— in Performance,
— in Value!

THE TRADE RATTAN MARK MAN

The MARR
A Perfect Joint Connector
(CAP MADE OF BAKELITE)

Take a screw driver — twist — nothing else required to make a perfect joint with the MARR CONNECTOR. We'll be glad to send you a SAMPLE — FREE!

SEE YOUR ELECTRICAL DEALER

Approved by Underwriters

THE RATTAN MANUFACTURING COMPANY
522 STATE STREET
NEW HAVEN, CONN., U. S. A.

GENERAL SALES AGENTS HATHEWAY AND CO.
75 MONTGOMERY ST., JERSEY CITY, N. J., U. S. A.

LET "BOSSY"
BRING IN THE CASH

The electric fence season is here! Farmers are already buying supplies of electric fence insulators and accessories for their electric fencing needs.

NOW is the time for you to contact your rural customers and prospects and get your share of the electric fence business. There are volume and profit possibilities in this line—get your share of the volume now available!

For customer satisfaction, insist on electric fence accessories made by Porcelain Products, Inc. Write for complete information and prices today.

PORCELAIN PRODUCTS, INC.
FINDLAY, OHIO

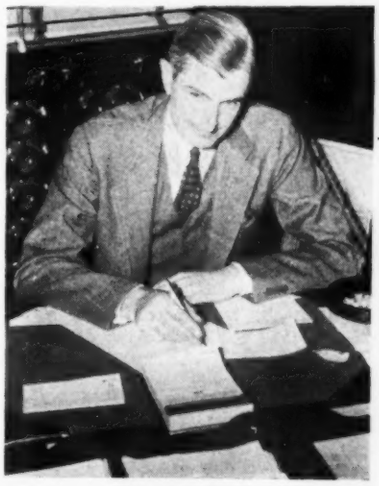
In the News

[FROM PAGE 60]

tor, outlined the changes in the wiring tables and other differences to be found in the new Code. Arthur Schanuel, field representative, National Adequate Wiring Bureau, was the speaker in the afternoon.

LIGHTING SCHOOL

A one-day fluorescent lighting school for contractors, building owners and managers, maintenance engineers, and lighting salesmen was held June 27 in San Francisco at the Western Merchandise Mart under the auspices of Pacific Coast Electrical Bureau, Northern Division. Dr. Leland H. Brown, assistant professor of electricity, Stanford University, and past president of the San Francisco Bay City Section, Illuminating Engineering Society, had charge of the program. It was designed especially to disseminate facts about fluorescent light sources, applications and methods of installation and was not a selling or promotional program. Attendance was from all parts of northern California.



PROGRESSIVE LEADER, Edward G. May of Albany, N. Y., is president of the New York State Contractors Association, the Albany Contractors Association, and his own enterprising contracting firm. In addition to setting up a contractors school in Albany, Ed is active in the promotion of a progressive wage scale for various classes of work, designed to bring more business to the organized contractors.

ADEQUATE WIRING ACTIVITIES

The success of the adequate wiring promotional campaign is revealed in the following local group reports in some of the many key centers.

FLOOR BOXES
and
WIRING
SPECIALTIES

No. 285 Double Duplex Receptacle Nozzle

The most attractive, compact, easy-to-install fitting on the market. Shown in the accompanying illustration with No. 200 Cover Plate.

No. 252-R Two Gang Box

Two gang adjustable floor box with No. 208 receptacle in one section. One cover plate with ½" flush brass plug and the other cover with 2" flush brass plug.

No. 130 Adjustable Water Tight Floor Box

No. 130 Box with No. 207 Bell Nozzle. Cut-away view illustrates how tapered unit receptacle fits tapered opening in adjustable ring. Cover plate 3½"—overall height 3½".

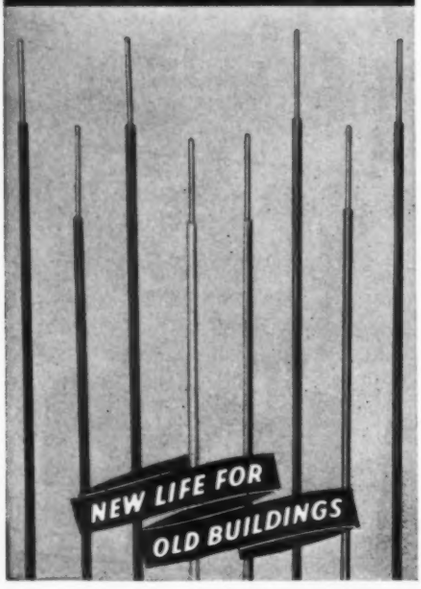
• The Latrobe Line is complete for all residential, commercial, and industrial requirements. In addition, the entire line is designed with the idea of reducing installation time . . . an important point to consider when selecting floor boxes and wiring specialties

Write for details TODAY!
FULLMAN MFG. CO.
LATROBE • PENNA.

GET Rewiring Jobs WITH FLAMENOL

Reg. U.S. Pat. Off.

Small Diameter Building Wire



The rewiring market is wide open. Buildings, at last, can be rewired inexpensively. New raceways are not necessary. Simply replace the present wires in existing conduits with Flamenol Building Wires. Effective copper can be increased as much as 400 per cent.

Rubber-covered, Type R — *Flamenol, Type SN*

Relative Diameters of Type R and Type SN Building Wires

Flamenol Building Wire is insulated with a synthetic compound. No braid is required. This insulation is tough, long aging, flame-retarding and resistant to moisture, oils, etc. Flamenol Building Wire is easy to handle, has a glossy wax finish and is available in a wide variety of colors. For further information and samples see the nearest G-E Merchandise Distributor or mail the coupon below.

General Electric Company
Section W-0127
Appliance and Merchandise Department
Bridgeport, Conn.

Sirs: Please send me information, and samples of Flamenol Building Wire.

Name.....

Address.....

City.....State.....

GENERAL ELECTRIC

In the News

[FROM PAGE 61]

Los Angeles, Calif.—The Electrical Development League of Southern California announced that 42 homes were certified during the month of May.

Spokane, Wash.—Adequate wiring was one of the five principal features in a competitive design of a house that could be built for $4,000. E. J. Peterson, the winning architect says, "The requirements for a certified adequately wired job in a house are so modest that I cannot afford to put out a set of plans that have not first been checked by the Bureau." The local Better Housing Bureau, sponsor of the model home will open it to public inspection.

Youngstown, Ohio — The Electrical League sponsored an adequate wiring exhibit at a recent Home Show to demonstrate the effects of inadequate wiring on the operation of lights and appliances. Approximately 22,500 persons visited the booth and heard the A/W story.

Milwaukee, Wis.—The Electrical League of Milwaukee, at the request of the I.B.E.W. Locals carried the adequate wiring story to electricians in Racine and Milwaukee. About 125 members of the Locals attended the meeting in each city.

Muskegon, Mich.—The local Adequate Wiring Bureau issued its first A/W certificate to a home owner on June 14. Some 33 outlets were added to the original plan. Francis Groleau was the electrical contractor on the job. Six more homes will soon be ready for certification.

Chattanooga, Tenn.—The T.V.A., in cooperation with the Extension Services of the State University, recently participated in conducting 18 meetings on residential wiring in nine counties of Tennessee and one county each in Mississippi and Georgia. A total attendance of 486 was reported.

Indianapolis, Ind.—The Electrical League of Indianapolis announced that it had recently issued its first A/W certificate.

Sheboygan, Wis.—Thirty thousand per-

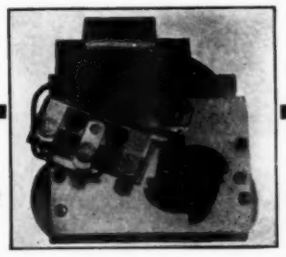
CONCEALED FLUORESCENT lighting is a specialty of L. W. Kieswetter, Syracuse, N. Y., contractor, shown here with his son Raymond. Mr. Kieswetter recently finished a large fluorescent installation in the clothes cases, beauty parlor booths and executive offices of the W. L. Addis Company, women's apparel store in Syracuse.

WOLVERINE SOLDERING LUGS

- ***High-Conductivity***
- ***Square-End***
- ***Uniform Dimensions***

BUY FROM YOUR JOBBER

WOLVERINE TUBE CO.
DETROIT, MICHIGAN



When You Install A Sign Sell 'Em An Adjustable-Speed, Versatile

AUTOMATIC FLASHER

Interchangeable rakers of one to ten points for various operating actions.

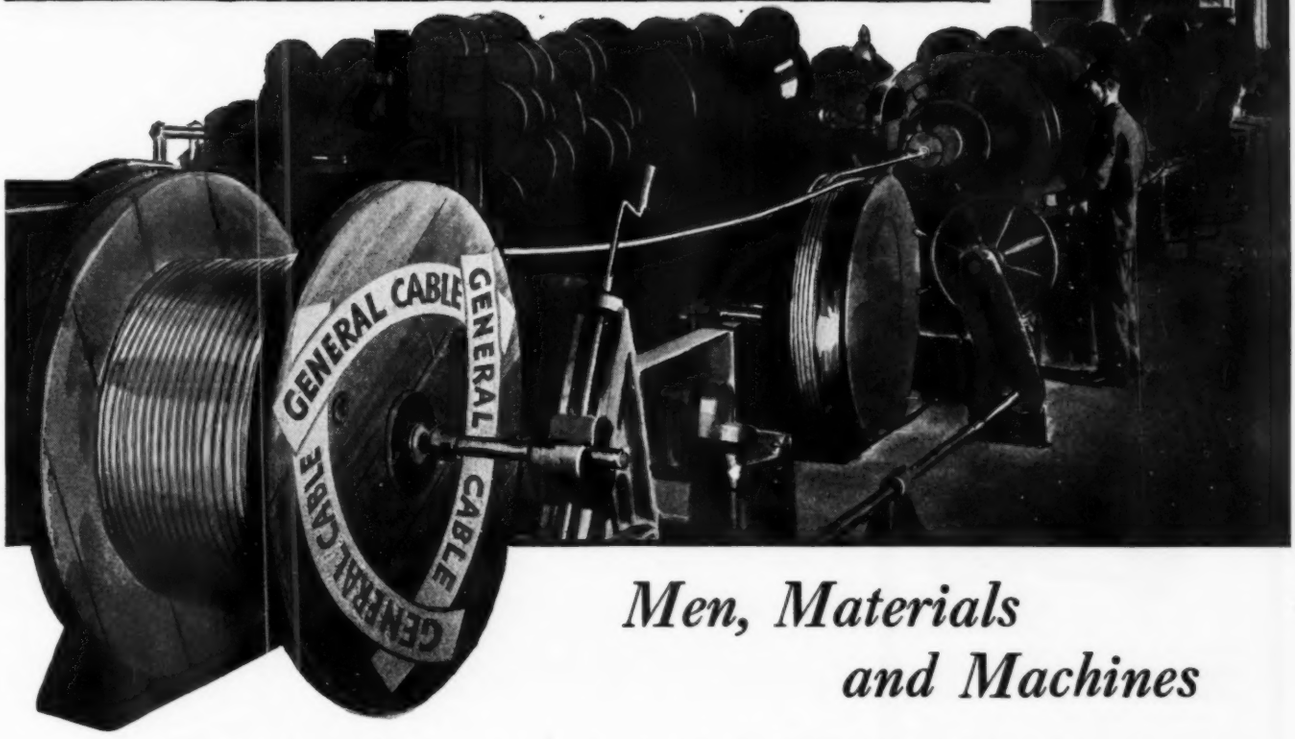
Speeds available of from one to 500 flashes per minute.

Motor speed adjustment to slow shaft speed as much as 20%.

All types, arrangements, and combinations of circuits for every flashing effect.

MODELS AS LOW AS $6.50

AUTOMATIC ELECTRIC MANUFACTURING CO.
Mankato * Minnesota



Men, Materials and Machines

To the nation's service and to the service of all who transmit and utilize electric power for accelerated production in shop, shipyard or industry, General Cable marshals its vast facilities for the production of wires and cables in all the infinite variety required. Through the years, its great plants have been brought to a peak of modernization for high-speed as well as high-quality production.

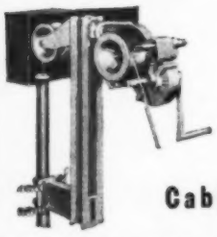
GENERAL CABLE

BARE and INSULATED WIRES and CABLES for EVERY ELECTRICAL PURPOSE

Stocked by Electrical Wholesalers Everywhere

General Cable Corporation Sales Offices: ATLANTA • BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT KANSAS CITY (MO.) • LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • ROME (N.Y.) • ST. LOUIS • SAN FRANCISCO • SEATTLE • WASHINGTON (D.C.)

Greenlee TOOLS Are EASIER And FASTER For The Man on the Job



Cable Puller

The Greenlee Cable Puller shown here eliminates the heavy, cumbersome equipment formerly used for pulling in cable. Now, this Greenlee, which anchors right on to the conduit through which pull is made, will make the toughest pulling job easy.

Conduit Benders

The Greenlee Hydraulic Conduit Bender is a portable, light tool, easily carried to the job and set up, that can be operated easily and quickly by one man, and one that will save you time and money on every job.

Knockout Tools

Greenlee Punches and Cutters will enlarge holes in metal boxes easily and quickly, leaving a clean, smooth hole that requires no reaming or filing. Another example of Greenlee tools that help you save time and money on every job.

Write for Catalog 31E

GREENLEE TOOL CO.

1706 Columbia Ave.

ROCKFORD ILLINOIS

In the News

[FROM PAGE 62]

sons recently viewed an exhibit on adequate wiring at the Merchants' and Manufacturers' Exposition held in this city.

MILLIONS FOR PLANT CAPACITY

A $963,000,000 program outlined in the War Department calls for permanent construction of plant capacity, to be available as a reserve, to produce munitions which can't be obtained from private industry. $558,000,000 covers 76 ordnance plants; $39,500,000 for 22 chemical warfare plants; $5,500,000, expansion of two quartermaster depots; $300,000,000 for 30 aircraft plants; $60,000,000 for three aircraft engine plants. An appropriation of $30,000,000 has already been made for a power plant.

BOOK REVIEWS

Artificial Light and its Application

This new edition is an up-to-date source book written by experts in the illumination field. It is a simple, clear and comprehensive survey of the latest lighting practice, presented in terms interesting to lighting engineers, students and laymen. Contains over 400 photographs, sketches, line-drawings, pictorial tables and graphs used to illustrate recent developments in fluorescent, electrical discharge and incandescent lamps.

Twenty-one individual chapters cover: Light sources; The Language of Light; Photometry; Light and Vision; Color; Light Control and Lighting Equipment; Interior Lighting Design; Industrial Lighting; School Lighting; Commercial and Public Building Lighting; Display Lighting; Home Lighting; Farm Lighting; Floodlighting; Recreational and Sports Lighting; Architectural Lighting; Electrical Advertising; Street and Highway Lighting; Light in the Theatre; Germicidal Radiations; Photographic Lamps and their Applications. Artificial Light and Its Application. 296 pages. Bound in a durable gray and dark-blue cover with spiral binding. Price $1.25. Individual chapters may be purchased at seven cents each. Published by the Advertising & Sales Promotion Department, Westinghouse Lamp Division, Westinghouse Electric & Manufacturing Company. 150 Broadway, New York. N. Y.

NEMA Industrial Control Standard

This new publication Industrial Control Standard, supersedes the edition of August, 1937. It contains general standards and definitions applying to resistors, contactors, brakes, auto-transformers and reactors, alternating current and direct current controllers; machine tool, synchronous motor, printing press and mine hoist control; magnetic control for steel mill auxiliaries, overhead traveling and floor operated cranes; terminal markings and guides to specifications for building equipment control apparatus. NEMA Industrial Control Standard. Price $1.00. Published by the National Electrical Manufacturers Association, 155 East 44th Street, New York, N. Y.

Electric Distribution Fundamentals

This is a new book which gives the perspective, development and economic background of electric distribution as a part of the general system of electric supply.

Sixteen chapters, with numerous practical problems, outline the features of both the utility, the industrial and interior distribution systems. Graphical methods of solving practical design problems are used and essential theory is explained largely by comparison and analogy.

The book is written primarily for the man on the job both in utility distribution and in the industrial wiring and commercial contracting branches of the industry. But the fundamental explanations set forth will help students, junior engineers, draftsmen, estimators and others to relate their mathematical and enginering studies with the specialized field of distribution. Electric Distribution Fundamentals. By Frank Sanford E.E. Price $2.50. 242 pages. Cloth bound. McGraw-Hill Book Co., 330 W. 42nd St., New York City.

easily—

swiftly—

"for KEEPS"!

That's the way you can make *all* your electrical connections . . . with

ILSCO

SOLDERLESS LUGS

Look for the V-Bottom wire opening — a "first" for ILSCO — the source of "for keeps" grip.

- ***Look to your Electrical Wholesaler for your electrical needs.***

DEPT. 7 EC

Ilsco Copper Tube & Products, Inc.

5629 Madison Road, Cincinnati, Ohio

IDEAL BX ARMOR CUTTER

NEW

Strips in one operation! Easy and convenient to use. No more bending of cable, fussing, shorts or wasted BX. Jaws are formed to take two or three wire, No. 12 or No. 14 cable. Handy pocket size. Inexpensive.

NEW **IDEAL**

"Snap-Tite" SWITCHBOX SUPPORTS

Securely hold any standard sectional switchbox in composition walls—Celotex, Plaster Board, etc. No screws or special tools required. Fastenings are all outside of box. Easy to install, inexpensive!

OTHER MONEY MAKERS

"Wire-Nuts"
"E-Z" Wire Strippers
Cable Ripper and Wire Gauge
Joist Boring Machine
Fuse Clip Clamps
Fish Tape, Reel & Puller
Test-Lite and Fuse Puller
Fuse Reducers
Fuse Pullers

IDEAL SOLD THROUGH JOBBERS

Electrical Products Division

Ideal Commutator Dresser Company

1041 Park Avenue Sycamore, Illinois

WHEN YOUR CUSTOMERS ASK

"Do You Handle Automatic Electric Private Telephone Systems?"

WHICH IS YOUR ANSWER?

"Sorry"

MEANING, *"We're satisfied with the amount of business we're now doing. See our competitor."*

"You Bet"

MEANING, *"We welcome the chance to talk to you about these systems and are prepared to take care of your needs."*

BUSINESS men today recognize that fast interior communication is a vital part of effective management and operation. As a result there is increasing interest in modern and efficient private telephone equipment.

The best way for you to get your share of this business is to become acquainted with the Automatic Electric line. Such a move will enable you to turn inquiries into orders—with a neat profit on every sale.

Automatic Electric, originators of the automatic telephone and makers of both public and private systems for fifty years, answers the demand for private telephones with an attractive array of systems from simple and inexpensive two-station outfits to comprehensive private automatic exchanges.

Your local electrical wholesaler will be pleased to supply you with complete information and prices on the full line of Automatic Electric private telephone systems and accessories. Talk to him today.

These intercommunicating systems are designed for private service. They are not intended to be connected with the public telephone system.

AUTOMATIC ELECTRIC

PRIVATE INTERIOR TELEPHONE SYSTEMS

Distributed by: AMERICAN AUTOMATIC ELECTRIC SALES COMPANY, 1033 West Van Buren Street, Chicago, Illinois

Sales and Service Offices in Principal Cities • In Canada: Canadian Telephones & Supplies, Limited, Toronto

Badger

Synchronous

ELECTRIC TIME SWITCHES

CONTRACTORS LIKE THEM BECAUSE:

they are dependable and easy to install

USERS LIKE THEM BECAUSE:

of economical operation and low cost

The Badger line of Time Switches is always in demand by Contractors who want dependability, accuracy, and the right type for a specific need. They know from experience that this is the line that gives them successful, profitable installations. They know when they install Badger Synchronous Electric Time Switches for their customers they are giving them complete satisfaction—accurate timing, economical operation, dependable service. You can't go wrong on Badger. Write for more particulars or see your Wholesaler.

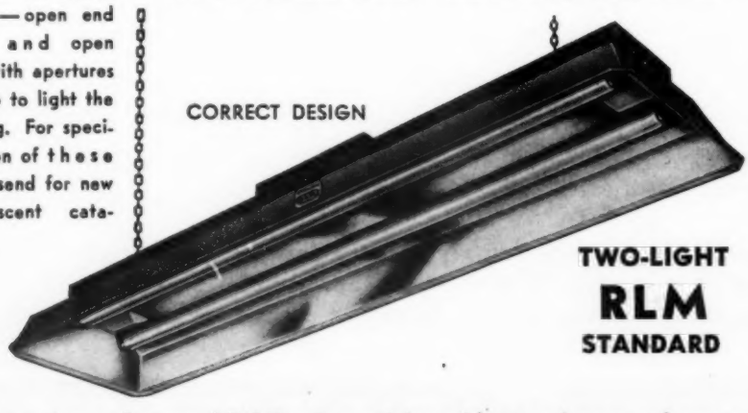
RELIANCE AUTOMATIC LIGHTING COMPANY
1937 MEAD STREET RACINE, WISCONSIN

OAMCO REFLECTORS

FLUORESCENT LAMP FIXTURES

The same design fixture (as illustrated) can be had in two other styles — open end type and open end with apertures in top to light the ceiling. For specification of these units send for new fluorescent catalog.

THIS NEW ADVANCE IN LIGHTING OPENS UP MORE INSTALLATION OPPORTUNITIES



This new type of general lighting is receiving widespread approval everywhere from users. It is economical and highly efficient for work that requires good, clear, uniform lighting without attendant high cost and maintenance. There are many well paying opportunities now for Contractors to install OAMCO Fluorescent Lamp Fixtures.

OVERBAGH & AYRES MFG. CO. 411 S. CLINTON ST. CHICAGO, ILLINOIS

In the News

[FROM PAGE 64]

structure and properties of weld metal; weldability of metals; designing for arc welded steel construction of machinery, designing for arc welded structures; typical applications of arc welding in manufacturing construction and maintenance.

Concisely written and profusely illustrated, this handbook is encyclopedic in scope, a complete reference guide for the man interested in the arc welding art. Procedure Handbook of Arc Welding Design and Practice. Price $1.50. 1125 pages, 1557 illustrations. Semi-flexible simulated leather bound. The Lincoln Electric Co., 12818 Coit Road, Cleveland, Ohio.

WITH THE Manufacturers

Westinghouse Lamp Promotions

A. E. Snyder, former general sales manager, has been appointed assistant general manager of the Westinghouse Lamp Division. Mr. Snyder's headquarters will be at New York.

B. H. Sullivan, former manager of the middle western district, will succeed Mr. Snyder as general sales manager, with headquarters in New York.

Leon S. Paletou, former manager of the southern district, becomes manager of the middle western district at Chicago, succeeding Mr. Sullivan.

Charles A. Conklin, manager of automotive products sales, succeeds Mr. Paletou as manager of the southern district.

R. E. Ebersole, formerly New York metropolitan branch manager for the northeastern district, succeeds Mr. Conklin as metropolitan manager.

•

G-E Personnel Changes

Arthur L, Scaife who has been assistant manager of the General Electric appliance and merchandise department's advertising division at Bridgeport, has relinquished his duties in the advertising division to become merchandising manager for the department, reporting to C. M. Snyder, appliance sales head.

Harold P. Smith, assistant to the appliance sales manager, becomes assistant to B. W. Bullock, appliance and merchandise advertising manager at Bridgeport.

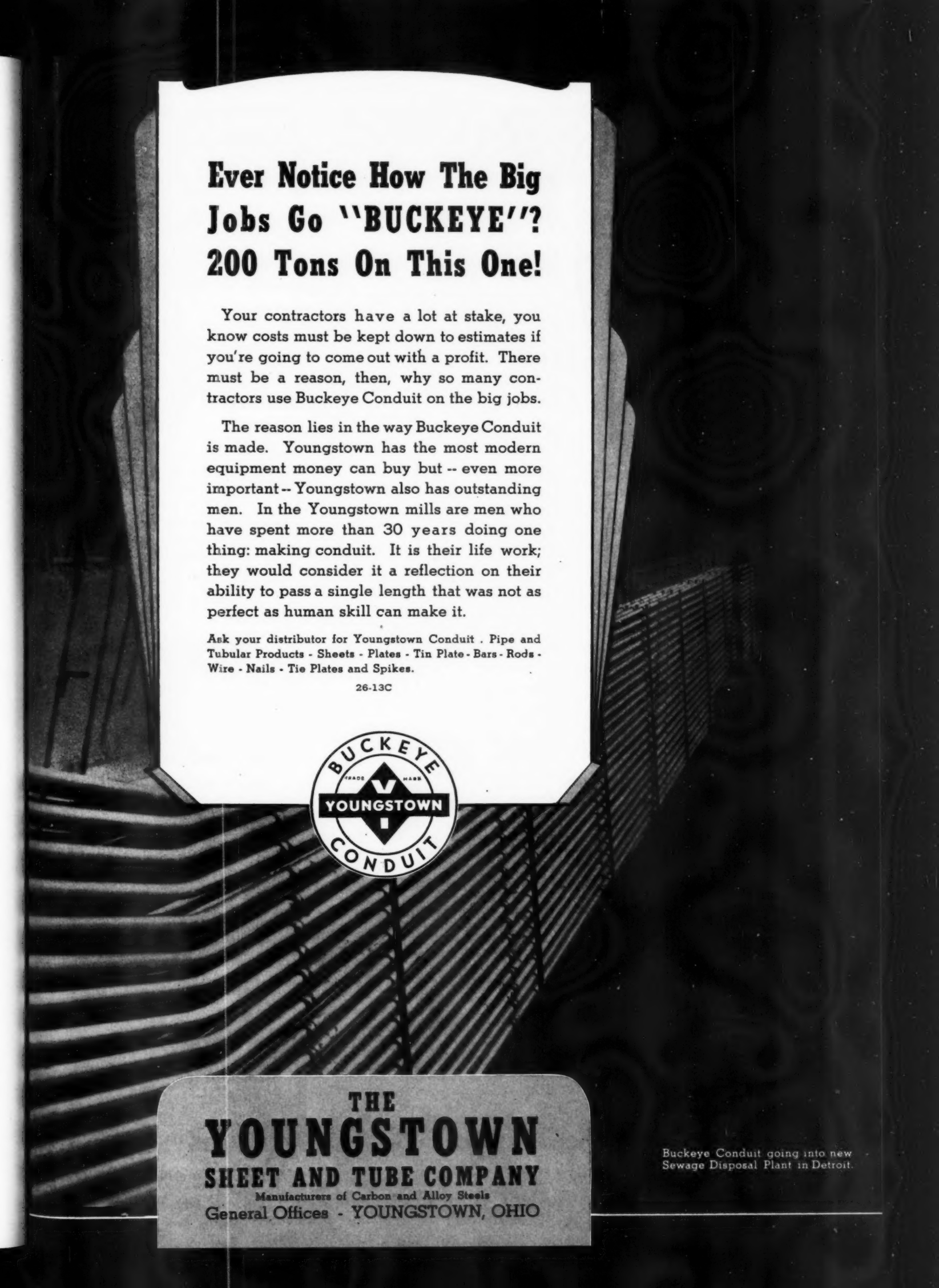
M. G. Johnson has been appointed production supervisor of the advertising division, succeeding D. A. Wood.

L. H. Taylor, who has been assistant manager of credits and collections of appliance and merchandise department at Bridgeport, will report to Mr. Snyder.

•

Graybar Changes

Graybar Electric Company recently opened a new branch office at 125 East Shiawassee St., Lansing, Mich. A. G.



Ever Notice How The Big Jobs Go "BUCKEYE"? 200 Tons On This One!

Your contractors have a lot at stake, you know costs must be kept down to estimates if you're going to come out with a profit. There must be a reason, then, why so many contractors use Buckeye Conduit on the big jobs.

The reason lies in the way Buckeye Conduit is made. Youngstown has the most modern equipment money can buy but -- even more important -- Youngstown also has outstanding men. In the Youngstown mills are men who have spent more than 30 years doing one thing: making conduit. It is their life work; they would consider it a reflection on their ability to pass a single length that was not as perfect as human skill can make it.

Ask your distributor for Youngstown Conduit . Pipe and Tubular Products - Sheets - Plates - Tin Plate - Bars - Rods - Wire - Nails - Tie Plates and Spikes.

26-13C

BUCKEYE TRADE MARK YOUNGSTOWN CONDUIT

THE
YOUNGSTOWN
SHEET AND TUBE COMPANY
Manufacturers of Carbon and Alloy Steels
General Offices - YOUNGSTOWN, OHIO

Buckeye Conduit going into new Sewage Disposal Plant in Detroit.

AFTER ALL—

SHAWMUT
SHUR-LAG
RENEWABLE
FUSES

The **CHASE-SHAWMUT COMPANY**

NEWBURYPORT
MASSACHUSETTS

In the News

[FROM PAGE 66]

Bird, formerly manager of the branch house in Flint, has been made manager of the Lansing office. He will have as his assistant C. M. Johnson, service supervisor, who previously held the position of Head Service Clerk in Boston, Mass.

E. C. Bryden, sales manager, will replace Mr. Bird at the Flint office and will be assisted by J. A. Ballard, service supervisor. Mr. Bryden was formerly salesman at Flint and Mr. Ballard was in the Detroit office.

A. W. Palin, Jr. has been made service manager of the Jacksonville house.

N. M. White has been named service manager of the St. Louis branch office. He was formerly located in the Baltimore branch.

•

Cutler-Hammer, Inc. has moved its Minneapolis office and warehouse to larger quarters, at 532 South Seventh Street.

•

Allis-Chalmers Mfg. Company, Milwaukee, Wis. has appointed A. I. Richardson manager of its district office at Dallas, Texas. He was previously located at the district office in Charlotte, N. C.

•

G-M Laboratories, Inc. of Chicago is erecting a new factory in the Montrose manufacturing district on the northwest side, to provide larger manufacturing and research facilities for its line.

•

Brooks Faxon, for the past 36 years New England manager of the **Wagner Electric Corp.,** has retired. He has been succeeded at Boston by Howard W. Petty, lately manager for the company in the Buffalo, N. Y., area.

•

Harold E. Trent Company has moved its offices and plant from 618 North 54th Street to larger quarters at 55th Street and Wyalusing Avenue, Philadelphia, Pa.

•

All-Steel-Equip Company, Aurora, Ill. is enlarging its plant and main office. Work has started on a new 40,000 sq. ft. addition to the main Plant No. 1 in Aurora.

•

Kulka Electric Mfg. Co., Inc. has moved from 108 East 16th Street, New York to 30 South St., Mt. Vernon, N. Y.

MINERALLAC HANGER

Conduit 3/8"—2 1/2"
Cable to 2 1/8" (with Bushings)

Cadmium and Everdur
MINERALLAC JIFFY CLIP

Sizes from .250" O.D. Tubing to 1 1/4" conduit.

See your Jobber

New York City Office
Theodore B. Dally
50 Church Street

MINERALLAC ELECTRIC CO.
25 N. Peoria St., CHICAGO

K&H Solderless Terminal LUGS

A SIZE and TYPE for every need!

ADJUSTABLE TAP-OFFS

A tap connector that automatically adjusts to wire size. Both wires held firmly over large contact area.

One bolt equalizes pressure on main line and snubs tap wire firmly.

Write for Catalog 3 LC

Several sizes—ranging from 4/0 Main to No. 4 Main. Tap Wire adjustment size 4 to 8 on each.

KRUEGER and HUDEPOHL
232-8 Vine St.
CINCINNATI, OHIO

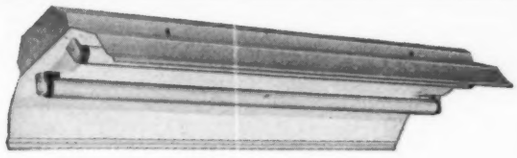
K&H Solderless CONNECTORS

TOMORROW'S ILLUMINATION TODAY

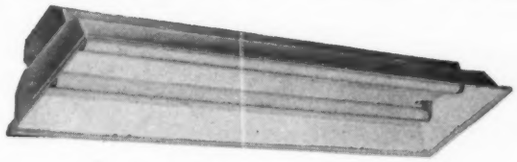
FLUORESCENT LIGHTING

by Westinghouse

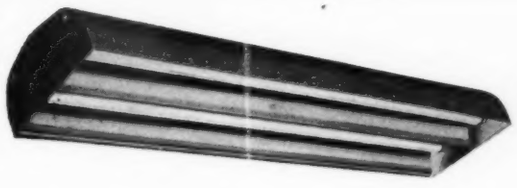
Two-lamp Type FPR Porcelain Enamel Fluorescent fixture with open end for industrial lighting.



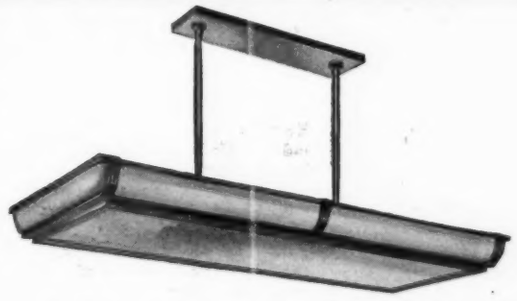
Two-lamp Type FPC Porcelain Enamel Open End unit with square end for continuous duct lighting.



Two-lamp Type FP RLM Fluorescent fixture approved by RLM Standards Institute.



Two-lamp Type FA fixture with Alzak Aluminum reflector.



Four-lamp Type CL-160 semi-indirect Commercial unit for general office illumination.

ANSWERING the demand for quality Fluorescent Lighting for Industry, Westinghouse—always a leader in the science of illumination—offers a complete line of Fluorescent fixtures to provide more light and better light for industrial applications.

For factory and machine shop use, for textile and printing plants where color correction is important, for individual operations and continuous production lines in automotive and kindred industries or for factory offices—there is a Westinghouse Fluorescent Luminaire to meet every need.

This spread of products includes not only the standard 2-lamp RLM fixture, but a range of industrial luminaires for one, two or three lamps; with porcelain enamel and Alzak Aluminum reflectors, and in 20, 30 or 40-watt lamp sizes. An unusual unit is the Open End FPC reflector for two 40-watt lamps which may be used to light a single operation or, when connected in multiples of two or more units, to provide continuous strip lighting for assembly lines. In addition, Westinghouse also makes a complete line of commercial Fluorescent fixtures.

Standard Westinghouse ballasts give minimum cyclic flicker in all two-lamp units, and high power factor in all units. Other features include rugged lamp holders, dependable and easily accessible starters, and the availability of several types of mountings.

117 Westinghouse Electric Supply Company offices or Independent Westinghouse Lighting Distributors are at your service locally with stocks and engineering services. Additional information may be obtained from Westinghouse Electric & Manufacturing Company, Lighting Division, Edgewater Park, Cleveland, Ohio.

Westinghouse

FLUORESCENT LIGHTING

LOXON GRIPON

. . . guard against breakage and theft!

THE NEW LOXON
No. 1427-A

THE NEW GRIPON
No. 1602-A

The McGILL LoXon Guard is your best assurance for protection against breakage and theft because it locks on with a key! However, where theft is a minor issue, the Gripon is fully as effective against breakage. The only difference in construction is that the key locking device on the LoXon is replaced by plain steel screws on the Gripon. New improvements have recently been made on these two guards:

1. **Shape has been changed to conform to new style lamps.**
2. **Heavier wire is used — No. 14 instead of No. 15.**
3. **Both LoXon and Gripon are available with or without reflectors.**
4. **There is NO increase in price — only increased value for the user!**

McGILL Products Can Be Secured from Your Electrical Wholesaler.

McGILL MANUFACTURING CO.
Box No. 720 VALPARAISO, IND.

McGILL

More Gossip

New League Organized

The Appleton Electrical League, for cooperation between the components of the electrical industry, was recently organized at Appleton, Wisconsin. The league membership is open to electrical contractors, inspectors, journeymen electricians and helpers, electrical instructors, public utility foremen and electrical jobbers' agents. League officers are: John F. Woehler, president; Arthur Schneider, vice-president; Howard Ebberhardt, secretary-treasurer and William Delain, sergeant-at-arms.

NECA PREXY Bob McChesney swaps stories with George Andrae of Milwaukee (center) and Howard Miller, U. S. Rubber Co., at the convention of the New York State Association of Electrical Contractors and Dealers at Lake Placid, N. Y.

Local Code Changes

The electrical contractors of Janesville, Wis., have succeeded in having their recommended changes to the city's electrical code adopted by the city council.

The amended ordinance requires that all wiring in new construction within the fire district must be in rigid conduit, except short leads to flexible fixtures, which may be in metallic armored cable. The rewiring of old buildings in this district must be in rigid conduit wherever feasible. Armored cable or BX may be used in certain instances to prevent unsightly work and damage to the building.

Another provision requires that all houses with more than four rooms and bath have at least two circuits and be wired with a 60 ampere service. Another provision calls for stricter requirements for examining and licening electricians.

New Red Seal Standards

A new Red Seal Adequate Wiring Standard for homes and apartments has just been released by the Electric Association of Kansas City. The new standard tightens the outlet requirements and adds capacity requirements to take care of the

For Quick Safe Permanent Connections Use

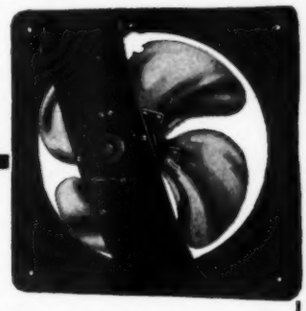
BAKELITE Safe—Strong. Wires hold firmly in Vee slot. One size for all wires.

Sherman FIXTURE CONNECTORS

You can rely on Sherman Connectors to make tight, permanent splices. Simply constructed for quick and easy handling. One size takes all wires commonly used. Ask for Bulletin No. 10 and free samples.

BRONZE High copper bronze for inside or outside use permanently insures against weather cracking. Non-removable screws.

H.B.SHERMAN MFG. CO.
Battle Creek, Mich.



AMERICA'S No. 1 VALUE

Here is the biggest Vent Fan value today. Nothing approaches it in quality, performance, and price. Features like these are unusual—enclosed motor with large oil reservoirs, chrome plated fan blades, streamline design, square panel for easy mounting, adjustable conduit box, horizontal or vertical operation. List prices:

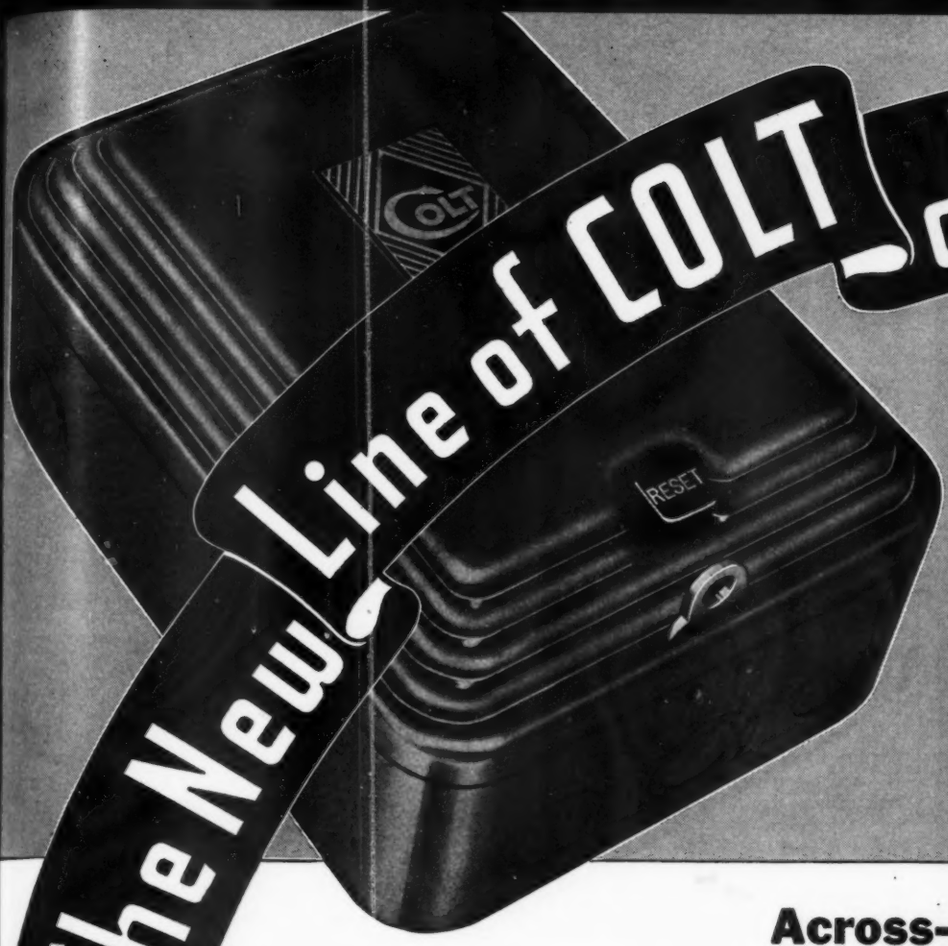
10"	$9.80
12"	12.50
16"	16.50

Write for complete information now.

SIGNAL ELECTRIC MFG. CO.
MENOMINEE, MICHIGAN
Offices in all principal cities

SIGNAL

The New Line of COLT MOTOR CONTROLS

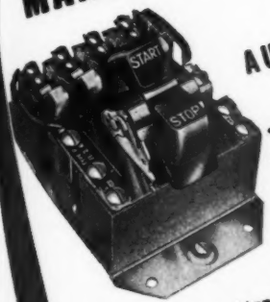


Ready NOW!

- --Manual Motor Starters
- --Manual Reversing and 2-Speed Starters
- --Magnetic Contactors and Relays
- --Magnetic Motor Starters
- --Magnetic Reversing Contactors and Starters
- --Magnetic 2-Speed Starters
- --Combination Starters

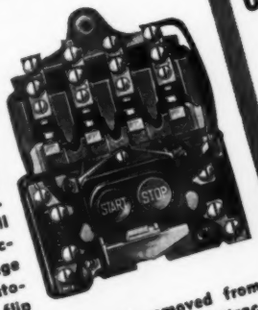
Across-the-Line Type
SIZES "0" and "1"

MANUAL STARTERS
with
AUTOMATIC
Relatching
TOGGLE MECHANISM



The New Colt Manual Starters incorporate features that assure dependable, precision operation for motor protection. The ingenious Automatic Relatching Toggle Mechanism eliminates any resetting operation. Silver to silver contacts. Built for long life of exacting service. Furnished in attractive steel cabinets with aluminum interior. Weatherproof and Explosion Resisting Cabinets also available. Send for Bulletin No. 404 for full description.

MAGNETIC STARTERS
with
Three Point Ball Bearing
FLOATING ACTION



Amazingly simple are these New Colt Magnetic Starters . . and ruggedly built to stand the strain of modern industrial service. Among their outstanding features are: 1. Three point ball bearing magnet action. 2. Change from hand to automatic reset by flip of plunger. 3. Coil easily removed. 4. Entire unit removed from cabinet by loosening single screw. 5. Attractive sheet steel, weatherproof and explosion resisting housings. Send for Bulletin No. 504 for full description.

CONTACTORS
and
COMBINATION
Starters

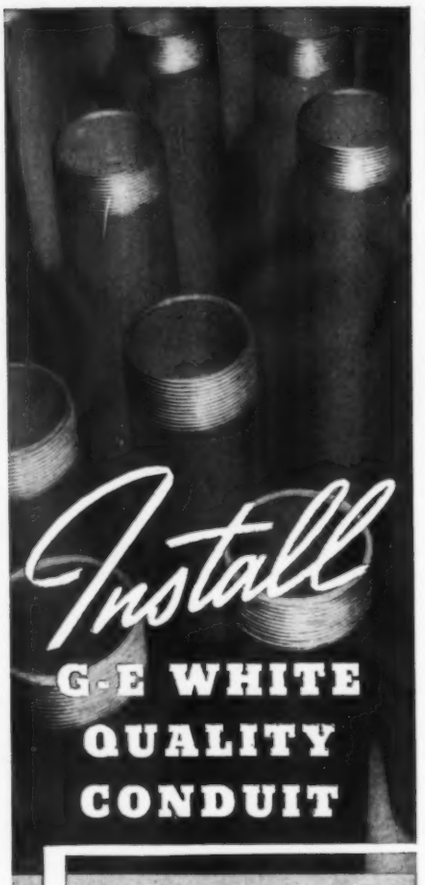
The new Colt Contactors are exactly the same in design as the Magnetic Starters — except that relays are omitted. Ball bearing action . . silver to silver contacts. Compact mechanism and rounded corner cabinets conserve space. Send for Bulletin No. 501.

COMBINATION STARTERS

New Colt Magnetic Starters are combined with Type "A" Fusible and Non-Fusible Safety Switches to provide Combination Starters for a wide range of uses. Safety switches have quick make and quick break, interlocking cover.

These Three Bulletins are Ready - - Send for Your Copies

COLT ELECTRICAL PRODUCTS
MANUFACTURED BY A WORLD FAMOUS ORGANIZATION
COLT'S PATENT FIRE ARMS MFG. CO., HARTFORD, CONN.
ELECTRICAL DIVISION



G-E White Rigid Conduit will help you to sell wiring jobs. Your customers will like these features:

Uniformity—Every length of G-E White Rigid Conduit is like every other length.

Dependability—G-E White provides permanent protection to wiring systems. It is hot-dipped galvanized, Glyptal-coated inside and out.

Durability—G-E White is resistant to heat, flame, gas, acids, alkalies, moisture and mechanical injury.

Only the finest raw materials are used in the manufacture of G-E White. Rigid specifications are strictly followed. Mild, rimmed steel provides strong welds and makes bending easy. A complete line of boxes and fittings is available.

Other Conduit Products

Quality is high also in other G-E Conduit products—Flexible Conduit, Electrical Metallic Tubing, Fiberduct, BX, BraidX, and Service Entrance Cable.

For further information see the nearest G-E Merchandise Distributor or write to Section C-0121, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.

GENERAL ELECTRIC

increased use of lamps and appliances in the homes.

Copies of the new standard, which was revised by Charles V. Dunn and his committee, were sent to all architects, builders and house-wiring electricians in the Association's territory. Special advertising and promotional measures are also being employed.

Repair Shop Expands

The motor repair division of the Buffalo Electric Co., Buffalo, N. Y., has a completely remodelled repair shop. In addition to the rearrangement and redecoration of the present shop, 6,000 sq. feet of working area have been added. New machinery and a complete new transformer rewind and repair department are features of the new shop. L. Richards is now superintendent of the motor repair division.

T. H. Green Retires

T. H. Green, president of the T. H. Green Electric Company of Rochester, N. Y., electrical contractors and motor repair shop, has retired from active service in that organization. Mr. Green spent the major portion of his 50 years in the electrical business as vice president of the Wheeler-Green Electric Company and for the past 14 years he was president of his own company.

R. F. Hornbeck, formerly vice-president succeeds Mr. Green as president and H. F. Janick now becomes vice-president and treasurer of the organization.

Motor Shop Moves

Berger Brothers, one of the larger motor repair shops in Rochester, N. Y., have moved from their former address at 1346 University Avenue to their new downtown home at 395 State Street. Since occupying their new home they have added a small motor and de-greasing department to facilitate their repair work.

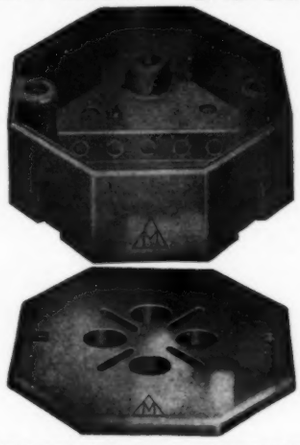
CAREFREE RELAXATION after a busy day at the New York State Contractors Convention, Lake Placid, is being enjoyed by (left to right) Louis Barth, L. I. City; A. A. A. Tuna; Irving Gaynor (seated on floor); Harry L. Langer and Louis Freund all of New York City and W. L. Bliven, chief inspector New York Fire Insurance Rating Organization, Syracuse, N. Y.

Profit by USING

ILLINOIS

Dependable Porcelain

OUTLET BOXES



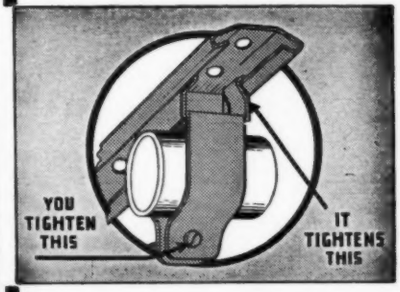
★Glazed and unglazed styles conforming to all existing standards of dimensions, spacing, position of knockout holes, and mounting screws. High mechanical and electrical efficiency.

Contractors who use these products not only establish themselves most securely with their customers but also build their business by making each job a true quality one. Send for bulletin.

ILLINOIS ELECTRIC PORCELAIN CO
MACOMB, ILL.

With Only One Screw to Tighten . . .

THE CLEVELAND CONDUIT HANGER



Gives You a Quicker Easier Installation

"CONVINCE YOURSELF"

"Send for Circular Giving Full Details"

THE CLEVELAND SWITCHBOARD CO.

2927 E. 79 St. Cleveland, Ohio

IS THIS FEATURE ON THE TIME-SWITCH YOU NOW BUY?

AN AUTOMATIC CARRYOVER ON A SYNCHRONOUS TIME-SWITCH, INSURING CONTINUOUS OPERATION FOR TEN HOURS DURING CURRENT INTERRUPTIONS.

CURRENT interruptions, even though rare, may raise havoc with definite time schedules controlled by synchronous time-switches, unless the time-switch has a carry-over feature to provide continued operation during these outages. Completely automatic, continued operation is assured during current interruptions up to ten hours with the Sangamo Synchronous Time-Switch with Carryover. Resetting the dial after short interruptions is, consequently, unnecessary, and accurate timing is maintained under all operating conditions.

THIS astronomic dial time-switch, too, has the carry-over feature, but in addition operates in accordance with sun-set and sunrise.

SANGAMO ELECTRIC COMPANY SPRINGFIELD ILLINOIS

EQUIPMENT News

Control Relay

A relay for controlling stoker in conjunction with time switch, limit controls and room thermostat. It can also be used as a relay for blower motors of unit heaters; as a relay between room thermostat and condensing unit in central plant-cooling systems. It is a single-pole relay combining a relay, low-voltage control transformers and terminal board in one assembly. Transformer provides low voltage for use with day-night clock or stoker timer. Six terminals on terminal block provide means for line, load and limit control connection, without use of connection box. Has three conduit openings for interconnecting with other control devices. General Electric Co., Schenectady, N. Y.

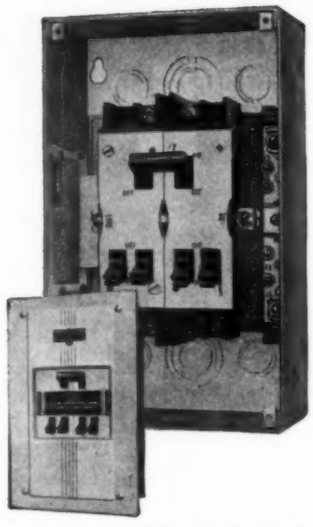
G-E RELAY

■

Adaptor

Fluralamp adaptor is for a.c. or d.c. fluorescent lighting. Step-down feature is concealed and unbreakable, and minimizes consumption of current. Hanging lugs on either end are provided. Swivel plug permits adjustment on horizontal plane. Available in two sizes—18-inch and 24-inch. For 110-120-volts. Eagle Electric Mfg. Co., 59 Hall Street, Brooklyn, N. Y.

EAGLE FLURALAMP ADAPTOR



CUTLER-HAMMER MULTI-BREAKER

Multi-Breaker

Type MB multi-breaker has an insulated groundable neutral. Inserting a screw in tapped hole of insulated neutral bar grounds neutral and case. These assemblies are available with from 1 to 16 breakers which can be arranged for 2 or 3 pole solid neutral circuits for a.c. service. Type MB has many applications in home, factory and on farm as service equipment for water heater or range service and for distribution panels. Available in either flush or surface mounting types. Cutler-Hammer, Inc., 315 N. 12th Street, Milwaukee, Wis.

■

CORRECTION

The table on page 78 of our June issue incorrectly listed the manufacturers of type RU small diameter building wire. This table should be corrected to include only four manufacturers of this type:

NATIONAL ELECTRIC PRODUCTS CORP.
JOHN A. ROEBLING SONS CO.
SIMPLEX WIRE & CABLE CO.
U. S. RUBBER COMPANY

S & M LAMP PLAY-LITE

Lighting Unit

"Red Cap" duplex Play-Lite fixture is designed for badminton and other sports and commercial lighting. It has two reflectors and wired sockets. Slip fit mounting for 1-inch pipe. It uses 200- or 300-watt clear lamps. Loosen two wing nuts on top of aluminum head, remove cover for connection to exposed pigtails. S & M Lamp Co., Inc., 119 West 36th Place, Los Angeles, Calif.

■

Connectors

A new connector which may be used either as a solderless connector or as a solder lug has been developed. Each connector covers a wide range of wire sizes. Inside of lug is shaped to obtain maximum holding power on all wire sizes within limits of lug. Lugs are designed to hold solder and function as solder lugs if desired. It has been approved for wire sizes from No. 10 to 1,000,000 CM. Square D Company, Detroit, Mich.

SQUARE D CONNECTORS

■

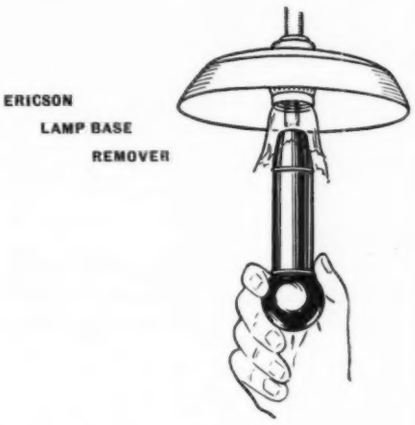
Drying Lamps

Four new infrared drying lamps in 250- to 1000-watt sizes, designed for industrial or commercial drying and heating jobs. Line includes 250-watt lamp with pear-shaped clear glass bulb and medium screw base; 250-watt reflector drying lamp in inside-frosted R-40 bulb, also with medium screw base; and 500- and 1000-watt lamps in clear glass, globular bulbs, both with medium and bipost bases, for heavy duty work. All for use on 105- to 120-volt circuits. Westinghouse Lamp Division, Bloomfield, N. J.

WESTINGHOUSE DRYING LAMP

Lamp Base Remover

The new C&E lamp base remover eliminates shocks, shorts and personal injuries, it is claimed. To remove bases of broken lamps from receptacles, insert into broken base and unscrew it easily and safely, even with the current on. Made in two sizes for medium and mogul screw bases. The Ericson Manufacturing Co., 5716 Euclid Ave., Cleveland, Ohio.



■

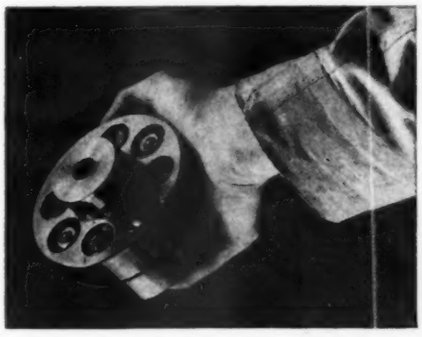
Relays

A new line of relays with plug-in construction has been developed, making it possible to remove assembled relay in its case from switchboard. Terminals extend from rear as bayonet fingers. Plug-in contacts are so designed that removing relay from its switchboard position does not disturb any of the circuits to which it is connected. False operation of circuit breakers or open-circuiting a current transformer are prevented by contacts which operate automatically when relay is removed. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

■

Couplings

Two new forged steel flexible couplings with 1⅛-in. and 1⅜-in. maximum bores have been added to this line. Specially designed to meet present trend of using alloy steel shafts carrying high percentage of torque capacity. Couplings have rubber bushings, positive drive, free end float and it is claimed, eliminate noise, backlash and lubrication problems. Ajax Flexible Couplings Co., Westfield, N. Y.



AJAX COUPLING

The TOUGHEST JOBS

Selection of correct material makes easy work of the toughest job. R & S Co's 40 years of experience in designing and building electrical fittings to fit your conditions, assures you of expert advice.

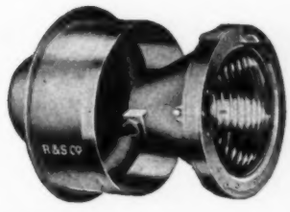
Let R & S help you solve that Tough Job application.

Explosion Proof and Dust-Tight for Hazardous Locations

- *Lighting Fixtures 100 to 500 Watts*
- *Switches—10 to 200 Ampere*
- *Circuit Breakers 10 to 600 Ampere*
- *Across The Line Starters to 100 HP.*
- *Receptacles and Plugs to 60 AMP.*
- *Sealing Fittings, Junction Boxes, Etc.*

Water-Tight and Weather-Tight for Outdoor and Moist Locations

- *Lighting Fixtures—75 to 300 Watts*
- *Switches—10 to 200 Ampere*
- *Circuit Breakers—10 to 600 Ampere*
- *Receptacles and Plugs to 400 Ampere*
- *Junction Boxes, Cable Supports*
- *Everlok Receptacles and Plugs*
- *Floor Boxes and Receptacles*
- *Submersible Flood Lights for Swimming Pools and Fountains*



Completely revised 256-page catalog (just off the press) listing

1. Many newly-developed products
2. Tables of useful information
3. Application and installation data
4. Dimension drawings of important items
5. NEW LOW PRICES

If you have not written for your copy—be sure to do so at once.

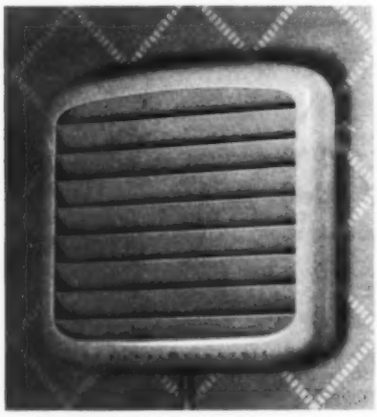
RUSSELL & STOLL COMPANY
(AND SUBSIDIARY, FEEDRAIL CORPORATION)
150 Park Place New York, N. Y.

EQUIPMENT News

[FROM PAGE 75]

Kitchen Fan

A new kitchen ventilating unit in which blades and motor assembly are concealed by a plastic grille, which may be removed for cleaning. Single-speed switch is operated by a pendant chain. When chain is released motor is turned on and outside door opened. Automatically operating outside door prevents entrance of wind, rain, snow, dirt or dust when fan is turned off. This line of ventilators also includes panel-type window fans. General Electric Co., Bridgeport, Conn.



G-E KITCHEN VENTILATOR

■

Instrument

These pocket size voltmeters are used by plant maintenance men, contractors and electricians to check line voltages. The 30-inch rubber covered leads with insulated finger holds facilitate testing open contacts, knife switches, sockets and fit standard receptacle plugs. Available in 150,- 300- and 600 volts a.c., 60 cycle. Burton-Rogers Co., 857 Boylston Street, Boston, Mass.

BURTON-ROGERS VOLTMETER

Connectors

Electrical connectors, Types XTBS and XDBS are designed to permit expansion or contraction of a tap conductor at any angle to overhead bus or transformer stud. Will warp with the substation. Provide universal joint with ball-and-socket alignment guides incorporated in both stud connector and flexible T-connector. Designed to accommodate all sizes of tubular conductors. Burndy Engineering Co., Inc., 459 East 133d Street, New York, N. Y.

BURNDY ELECTRICAL CONNECTORS

■

CUTLER-HAMMER CONTACTORS

Contactors

The 540 Line of d.c. heavy duty contactors has been added to this line of electric motor control. It is available in 100, 150, 300, 600, 1200 and 1800 ampere sizes. High efficiency type arc blow-out drives arc from contacts to large arc horns above contacts. Heavy duty arc shields with carbofrax inserts opposite contact tips, lift off for inspection. Contact troubles are eliminated by dust-safe, vertical contact construction. Cutler-Hammer, Inc., Milwaukee, Wis.

WESTINGHOUSE FLOODLIGHT

Floodlight

A new floodlight, known as "Servisflood", is designed for service stations. Has dual beam, providing wide shaft of light with horizontal top cutoff for yard illumination and narrow beam for building highlighting. Width of narrow beam is adjustable by means of two external knobs at rear of lamp housing. Floodlight housing is closed and has heat-resisting glass cover, making assembly weatherproof, dust tight and bug tight. Three types are standard—one for 300-500 watt incandescent or 400 watt mercury lamps; one for 500 watt Bi-post lamps and one for 750-1000 watt Bi-post lamps. Five mounting brackets are available, permitting any type of suspension. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

■

Motor

A new line of ball bearing and self-aligning sleeve bearing shaded pole motors has been designed. Mechanical system does not depend on stator for alignment. It uses die cast end frames with spacer shell held in compression by means of thru bolts. Also provides flat external end frame surface for mounting to gear boxes and other flat surfaces. Motors will operate in any position. Power output ranges from three to fifteen watts. A.C. motors are of four-pole design. Russell Electric Co., 348 W. Huron St., Chicago, Ill.

RUSSELL BALL BEARING MOTOR

It's good business to have

FACTS AT YOUR FINGERTIPS!

You'll find the answer to thousands of questions about electrical products in the ELECTRICAL BUYERS REFERENCE

Ever stop to think of the quantity of valuable data that lies between the covers of that big orange-and-blue volume? It includes:

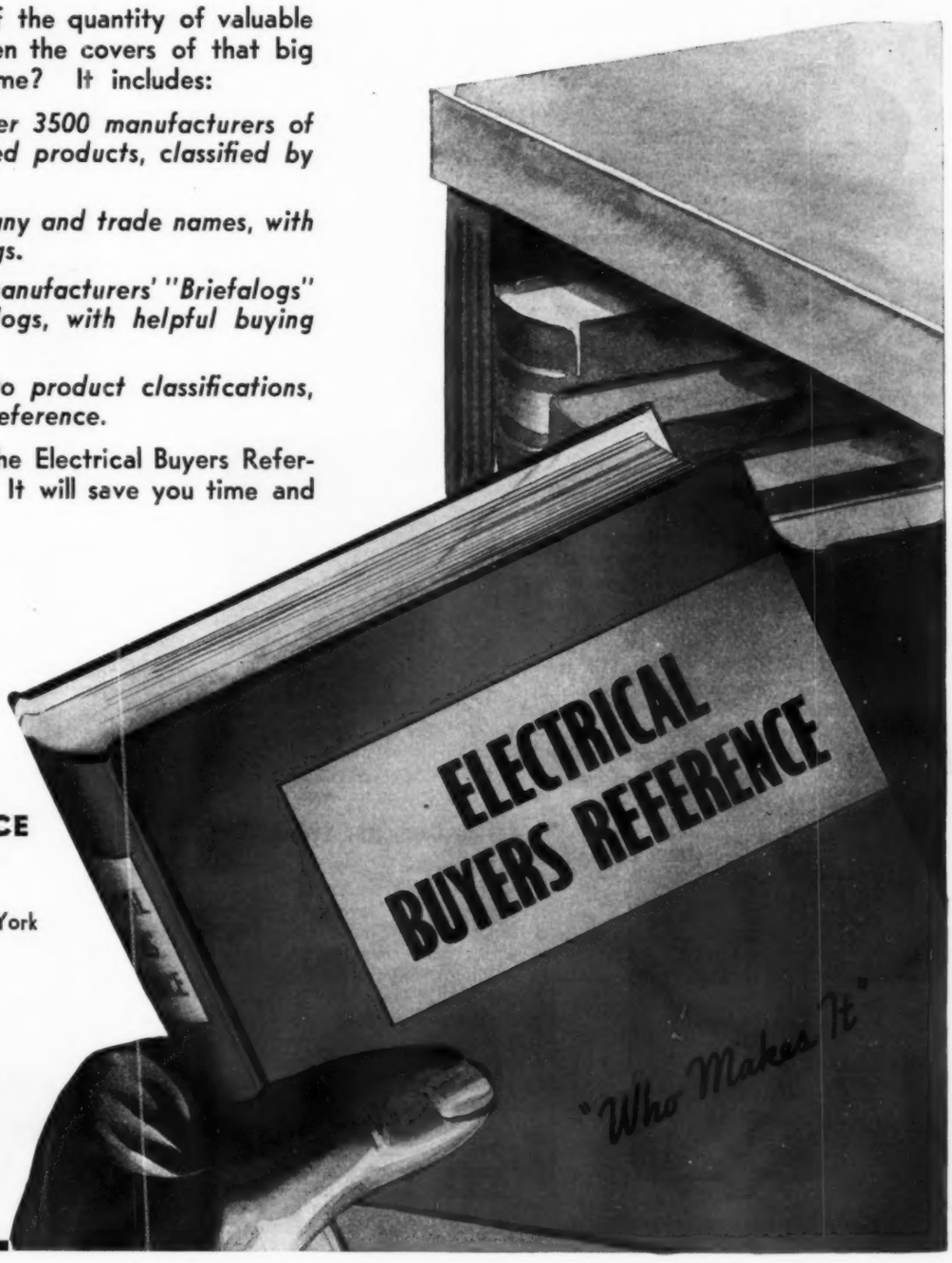
A directory of over 3500 manufacturers of electrical and allied products, classified by products.

An index of company and trade names, with thousands of listings.

A solid section of manufacturers' "Briefalogs" —condensed catalogs, with helpful buying data.

A general index to product classifications, facilitating quick reference.

Keep your copy of the Electrical Buyers Reference close at hand. It will save you time and money.



ELECTRICAL
BUYERS REFERENCE

A Unit of the McGraw-Hill Reference Service

330 W. 42 St., New York

EQUIPMENT NEWS

[FROM PAGE 76]

Plugs and Receptacles

A new series of polarized 3-pole plugs and receptacles for use on electrical and electronic devices. Design allows mounting both plugs and receptacles direct to sheet metal panels with spring steel retainer ring, or with a riveting plate; or above or below surface with mounting shells; or as cable connectors having indestructible steel caps equipped with end or side outlets, or with cable clamps. Fits in same mounting holes and mountings as standard 2-pole series. American Phenolic Corporation, 1250 Van Buren St., Chicago, Ill.

AMERICAN PLUG AND RECEPTACLE

■

Pilot Relay

The Photoswitch pilot relay is an electronic switch for use on meter relays, sensitive temperature controls, electrical recording equipment, electrical precision gauges, electrical flow meters. It is also used for automatic liquid level control. Control is effected by touching of two fine wires or contacts or by its being short-circuited by a liquid or any moist material. Three millionths of an ampere may control any current desired. Photoswitch Incorporated, 21 Chestnut Street, Cambridge, Mass.

PHOTOSWITCH PILOT RELAY

REVERE ELIPTICAL FLOODLIGHT

Floodlight

This new eliptical floodlight illuminates large or small areas. All adjustments can be made from one position, controlled by two set screws—one for vertical positioning of beam pattern and one for horizontal. Neck, which houses socket and forms reflector mounting, offers wide range of positions. Reflector can be removed for cleaning without disturbing socket, wiring or setting. Accommodates 750-, 1000- and 1500-watt lamps and also available for 300- and 500-watt lamps as well as 400-watt mercury and 750-, 1000-watt Bi-post. Mounting brackets are available for wall, cross arm or pipe clamp installations. Revere Electric Co., 2907 N. Paulina St., Chicago, Ill.

■

G-E SERIES-CAPACITOR

Series-Capacitor System

A new series-capacitor system for improving power-factor in resistance welding has been developed. It consists of capacitor equipment connected in series with transformer primary of resistance welding machines and proper rating to improve power-factor of welding circuit to approximately unity. Equipment can be applied to spot, projection, seam and butt resistance welding and is used with both synchronous and nonsynchronous control. May be applied to existing welding machines as well as new applications. Series-capacitor is made up of individual Pyranol capacitor units mounted in suitable rack, available for floor, wall or ceiling mounting. General Electric Co., Schenectady, N. Y.

Capacitors

A new line of capacitors for power factor correction applications in fluorescent lamp circuits. Included are three general types, varying in physical dimensions to fit all standard wiring channels. Units are "Dykanol" impregnated and filled and are hermetically sealed in steel containers to provide protection against atmospheric conditions. Type KF is 2¼-in. wide by 1¼-in. thick and varies in length. Available in seven values from 3 to 28 mfd., with voltage rating of 240. Type KS measures 2$\frac{1}{16}$ by 1-in. and furnished in eleven values ranging from 2 to 8 mfd. Rated for service on 120-240-volt lines. Type KW is 1$\frac{7}{16}$-in. by 1¼-in. and spacing between terminal centers $\frac{5}{16}$-inch. Cornell-Dubilier Electric Corp., South Plainfield, N. J.

CORNELL-DUBILIER CAPACITORS

■

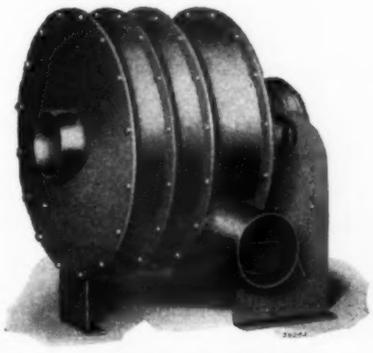
Welder

The new a.c. Arcmaster welder features a multiple coil transformer, assuring even flow of current to electrode. Either ground or welding leads can be connected with any of the input wires without completing an electrical circuit. Built for heavy duty operating conditions, it has transformer laminations of silicon steel and oversize core and wire to withstand heat created under constant usage. Unit is furnished in three models with ranges of 10-200 amperes, 10-250 amperes and 10-300 amperes. All models have 220, 60 cycle voltages. Bear Mfg. Co., Rock Island, Ill.

BEAR ARCMASTER WELDER

Motor Blower

Type "G" Motorblower is designed to furnish air for general industrial uses. Can be installed on any floor. Built-in blast gate is located in blower discharge and flexible pipe connections are provided for connecting either intake or discharge to shop piping. Available in 72 sizes; pressures from ½ to 2¼ lbs. and volumes from 100 to 4500 cfm. Discharge opening on all sizes can be located in any one of eight positions in steps of 45 deg. Ingersoll-Rand Co., 11 Broadway, New York, N. Y.

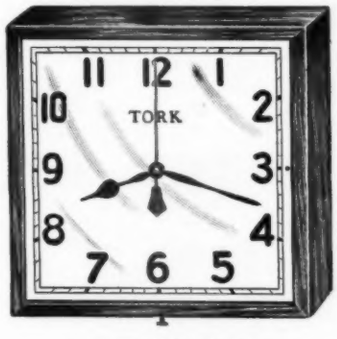


INGERSOLL-RAND MOTORBLOWER

■

Wall Clock

A 14-inch electric wall clock for use in offices, stores, schools, factories and shops. It has a 12-inch dial and is self starting. Some of the features are—sweep second hand; curved glass front; convenient set knob; mitered wood case. It is finished in walnut or white enamel. The Tork Clock Co., Inc., Mount Vernon, N. Y.



TORK WALL CLOCK

■

Attic Ventilator

The Rex-Airate Thrift-Pak is an attic ventilator for use in small homes. Unit is installed in attic with ceiling grille in place beneath vent box. It should be started after sundown to exhaust heat that has accumulated in house and attic during the day, replacing it with cool night air which is drawn through open doors and windows. Features are— all-steel cabinet; six-bladed fan; belt drive; bearings with porous composition bushings; 1/6 hp. split phase motor. Air Controls, Inc., 1933 West 114th Street, Cleveland, Ohio.

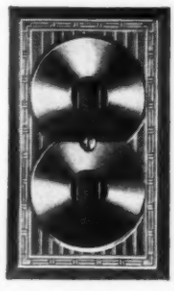
AIR CONTROLS ATTIC VENTILATOR

■

Duplex Outlet

A new duplex convenience outlet called "E-Z-Find". It is easy to find contact slots with any plug cap. Finding grooves have been extended to plate and combination of receptacle and plate forms a self-locating feature for any plug cap. Curved or dished surface of plate slides plug prongs to exact position from any point in a wide area. It is desirable for installation behind furniture and in dark corners. Available in brown bakelite or white cream-tinted ivorylite. The Arrow-Hart & Hegeman Electric Co., 101 Hawthorn St., Hartford, Conn.

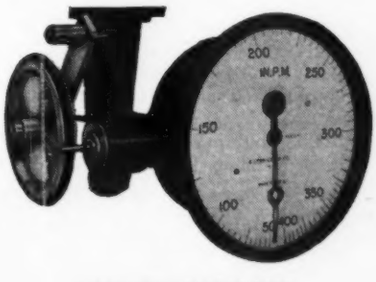
A.H. & H.
DUPLEX
OUTLET



■

Instrument

O-Z improved stationary tachometers are for correct revolutions or surface speeds per minute. Dial is 6-in. in diameter; housing 2¾-in. deep. This method of drive may be used for any low speed indications of peripheral speeds. It shows the r.p.m., right or left, of revolving objects; surface or peripheral speed in any desired unit; speed variations occurring during fraction of one revolution. O. Zernickow Co., 15 Park Row, New York.



ZERNICKOW TACHOMETER

THIS HYDRAULIC PULLER *makes a one-man job of removing Pulleys—Gears—Pinions—Couplings—etc. from Shafts*

Low Price
12 TON
$85.00

Saves Time—Labor—Spoilage for Electric Motor Service Shops and Industrial Maintenance Departments

This portable, reasonably-priced Hydraulic Puller can save in countless ways on many operations around the shop. All steel construction—no breakable cast parts—adjustable for height and spread. Comes in 5- 12- and 20-ton capacities. (Popular size 12 tons.) Eliminates spoilage of expensive equipment and is easy and safe to use. The sturdy hydraulic jack with built-in, easy operating oil pump can be lifted from pocket on puller and used on any jacking operation.

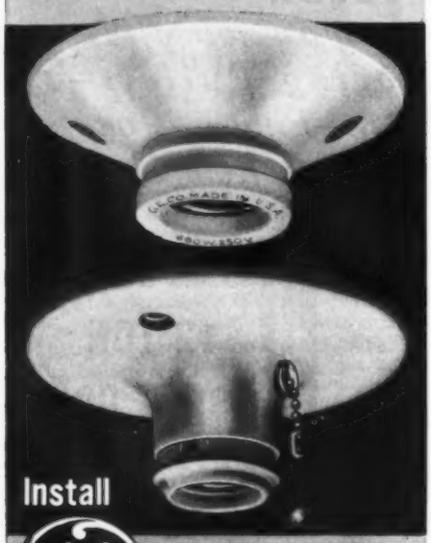
Electric Motor Service Shops and Industrial Maintenance Departments are cutting expenses through time and labor savings by using this hydraulic puller. Let us send you details of construction and applications —find out what it will do for you. Mail coupon NOW!

INDUSTRIAL ENGINEERING EQUIPMENT CO.
323 E. Fourth Street Davenport, Iowa

Please send me full data on your Hydraulic Puller.

Name .....
Street .....
City ..... *State* .....

BE MODERN



Install

White Plastic Receptacles

Look at the advantages which G-E White Plastic Receptacles, for outlet box mounting, give you:

1. Lighter than porcelain
2. Breakage practically nil
3. Ribbed construction
4. Increased diameter of base
5. More wiring space
6. Binding screws accommodate No. 12 wire
7. Knockouts for drainage in keyless type

These receptacles are attractively designed. The line includes:

Pull Receptacles with Shadeholder Grooves

Textolite Interiors—250 Watts, 250 Volts

GE3015 For 3¼-in. Outlet Box, 7-in. Chain
GE3016 For 3¼-in. Outlet Box, 7-in. Chain and Insulator Link
GE3017 For 3¼-in. Outlet Box, Short Chain and Cord
GE3018 For 4-in. Outlet Box, 7-in. Chain
GE3019 For 4-in. Outlet Box, 7-in Chain and Insulator Link
GE3020 For 4-in. Outlet Box, Short Chain and Cord

Keyless Receptacles with Shadeholder Grooves—660 Watts, 250 Volts

GE155 For 3¼-in. Outlet Box
GE088 For 4-in. Outlet Box

Use these receptacles in the many places in stores, factories, warehouses, homes, etc., where this type lampholder is needed. For information see the nearest G-E Merchandise Distributor or write Section D-0127, Appliance and Merchandise Dept., General Electric Co., Bridgeport, Conn.

GENERAL ELECTRIC

EQUIPMENT NEWS

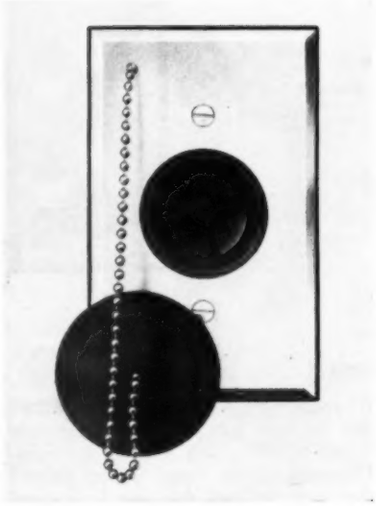
[FROM PAGE 79]

Lighting Unit

Miralume C-101, is a 100-watt unit designed for general commercial illumination. It uses two 40-watt fluorescent lamps. Lamps and chassis are housed in glass-paneled shade, triangular in cross-sectional shape. Overall dimensions are length 49-inches, width 10-inches and height 4½-inches. Available for operation on either 110-125-volts or 220-250-volts, 60 cycle, a.c. Can be supplied in 50 cycle a.c. or unwired. Unit has been corrected for power factor and stroboscopic effect. Hygrade Sylvania Corp., Salem, Mass.

HYGRADE MIRALUME

■



G-E WEATHERPROOF OUTLET

Outlets

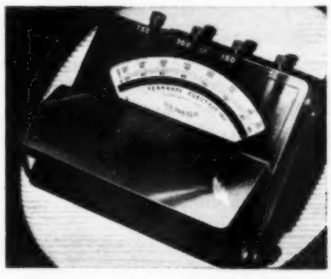
Two new outlets have been designed, one for use with electric wall clocks and the other for outdoor use. Clock hanger outlet provides support and electrical connection for clocks. It includes brass plate with hook. Outlet is recessed to conceal cord and plug and allows clock to hang flush with wall. Weatherproof outlet is for use as outdoor lighting or appliance outlet or for use in damp locations. Includes cadmium - finished aluminum - lacquered plate, rubber mat for under plate and rubber cap. Cap is attached to plate by bead chain. General Electric Co., Bridgeport, Conn.

G-E CLOCK HANGER OUTLET

■

Instrument

A new triple range a.c. portable voltmeter, Model 956, for industrial and central station use and all service and field testing work. May be used on d.c. circuits with slight sacrifice in accuracy. Meter is in black walnut case fitted with hinged cover and carrying strap. Conforms to AIEE and NEMA specifications, also Army and Navy. Ferranti Electric, Inc., 30 Rockefeller Plaza, New York.



FERRANTI INSTRUMENT

■

LITTELFUSE POCKET TESTER

Tester

A new low-voltage pocket tester, called Tattelite, covers range from 3 to 25-volts, momentary up to 50-volts, a.c. or d.c. It uses a high temperature coefficient lamp.

Lamp is housed in molded, transparent tenite case. Has tinsel wire leads and alligator clips. Draws only 70 mils. at 12-volts. Designed for use on 24-volt control systems in heating and air conditioning, but also used in circuit checking in automobiles, trucks and buses, airplanes, telephones, storage battery circuits. Littelfuse, Inc., 4757 Ravenswood Ave., Chicago.

■

Combination Starter

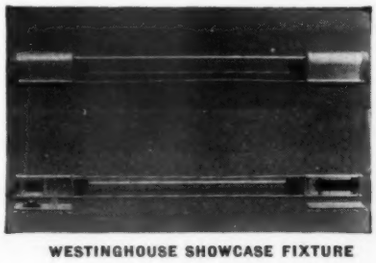
New magnetic combination starter with motor circuit disconnect and magnetic starter in one enclosure. Some of the features are compact design; interchangeable contacts; convertible fusing; removable interior; 110-volt control; 2 and 4 pole assemblies; multiple unit dimensions; 3 position handle action; quick-make and quick-break mechanism; operating handle and disconnect; dust free. Also available in semi-dust-tight and dust-tight protective, non-ventilating enclosures. The Trumbull Electric Mfg. Co., Plainville, Conn.

TRUMBULL COMBINATION STARTER

■

Showcase Fixture

A self-contained showcase fixture for 20- and 30-inch Sterilamps for refrigerated display cases in meat markets, dairy product stores and other places where wide-spread, bacteria-killing ultraviolet radiation is desired. Can be installed in upper front corner of cases or under shelves. Operating transformer is enclosed in one of boxes located at either end of fixture; switch and power line connections are in other. 115-volt, 60-cycle is required for transformer, which is designed to give low current through lamp. When cover of transformer is removed, power is cut off. Westinghouse Lamp Division, Bloomfield, N. J.

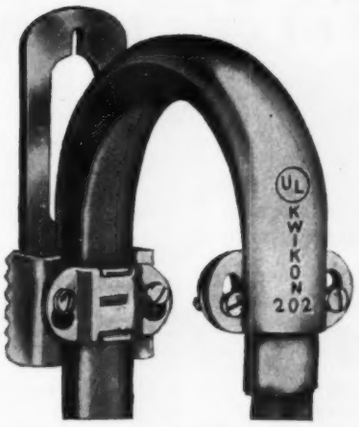


WESTINGHOUSE SHOWCASE FIXTURE

Hook Up With
KWIKON No. 202
Service Cable Head

For the most economical, approved method of service cable installation

only 20c each
in lots of 50 or more



This most effective means of service cable installation is now made even faster and easier by the new hanger-type back. And, our constantly growing number of users makes it possible for us to pass along this improvement at no increase in price.

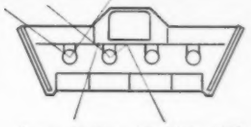
Approved by Underwriters' Laboratories, Inc.

KWIKON CO. 626 W. JACKSON CHICAGO, ILLINOIS

ATTRACTIVE *LOUVERED* FLUORESCENT LIGHTING . . .

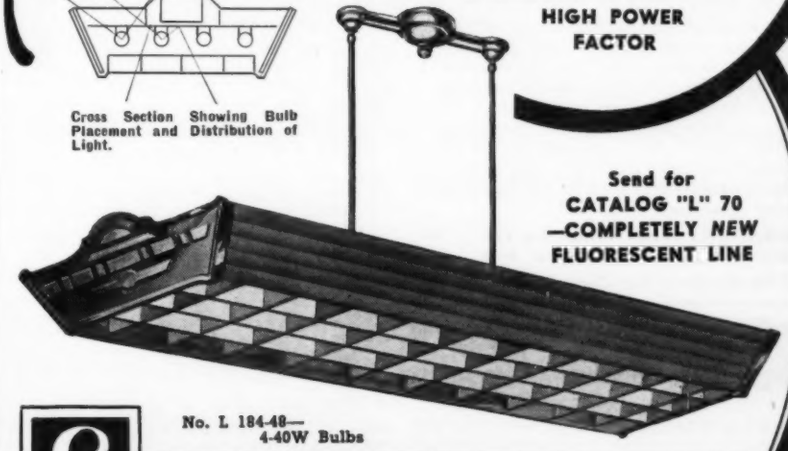
A NEW Efcolite Fluorescent unit designed to provide increased high levels of illumination with the cool light from four fluorescent lamps. Glass sides and an open grille bottom conceal the bulbs from direct view, which are placed so that a maximum light output of 60% downward and 40% upward is obtained.

HIGH POWER FACTOR



Cross Section Showing Bulb Placement and Distribution of Light.

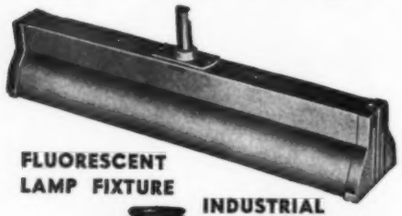
Send for CATALOG "L" 70 —COMPLETELY *NEW* FLUORESCENT LINE



No. L 184-48— 4-40W Bulbs

EFCOLITE CORPORATION TRENTON, N. J.

BE READY with MULTI REFLECTORS



FLUORESCENT LAMP FIXTURE

INDUSTRIAL REFLECTORS

Multi is always right out in front to meet the need for the most modern, efficient lighting. Contractors find the right type for any requirement in factory, office, shop, or home. There are countless opportunities everywhere and with Multi Reflectors to help you fill the bill, business just naturally comes your way. Send for our descriptive circulars and—be ready!

MULTI ELECTRICAL MANUFACTURING CO.
1840 W. 14th St. Chicago, Ill.

HERE'S HELP

for technical and business men

NEW 1940 Catalogue of McGRAW-HILL BOOKS

Over 1500 Books Described

Here is a guide to practical, expert information on many business and technical subjects. It contains clear, concise descriptions of more than 1500 authoritative, informative books written by leaders of business, industry and research. Get your copy now. In it you will find the up-to-date books that will give you the facts—experience—data—you need in solving your particular problems.

McGraw-Hill Books bring you the experience of experts in your field

Mail This Coupon for Your Free Copy

McGraw-Hill Book Co., Inc., 330 W. 42 St., N.Y.
Please send me a free copy of the New 1940 Catalogue of McGraw-Hill Books. I want to know more about: (Name subjects of most interest to you.)

.....

.....

Name .....

Address .....

City..... State.....F.E.C. 7-40

Advertiser's Index

*Adam Elec. Co., Frank..... 4
*Allen-Bradley Co.....49, 50
Aluminum Co. of America..... 59
American Automatic Elec. Sales Co. 65
*American Transformer Co..... 56
Anaconda Wire & Cable Co..... 6
*Appleton Electric Co..... 57
Arrow-Hart & Hegeman Elec. Co. 26
*Automatic Elec. Mfg. Co..... 62

Beaver Pipe Tools, Inc..... 48
Brach Mfg. Corp., L. S..... 82
*Briegel Method Tool Co..... 44
Bryant Elec. Co..... 55
Bunting Frass & Bronze Co..... 45
Burndy Engineering Co..... 52

*Carboloy Co., Inc..... 47
*Chase-Shawmut Co..... 68
Chicago Rawhide Mfg. Co..... 46
*Circulators & Devices Mfg. Corp.. 82
Clark Controller Co., The..... 41
Cleveland Switchboard Co., The.. 72
Colt's Patent Firearms Mfg. Co.... 71
Crescent Ins. Wire & Cable Co.. 22
Curtis Lighting, Inc..... 23
*Cutler-Hammer, Inc..... 19

Day-Brite Lighting, Inc..... 33
*Dolph Co., John C..... 45
*Doors & Operators, Inc..... 48

*Efcolite Corp..... 81

*Fullman Mfg. Co..... 61

General Cable Co..... 63
*General Electric Co. (Bridgeport) Back Cover, 62, 72, 80
*General Electric Co. (Schenectady) Inside Front Cover, 35, 36
*Graybar Electric Co..... 8
*Greenlee Tool Co..... 64

Hazard Ins. Wire Works Div.... 25

*Ideal Commutator Dresser Co..... 64
*Ilg Electric Vent. Co..... 27
*Illinois Electric Porcelain Co.... 72
*Ilsco Copper Tube & Products, Inc. 64
Industrial Eng. Equip., Inc..... 79

Johnson Bronze Co..... 47

Kirkland Co., H. R..... 82
Krueger & Hudepohl, Inc..... 68
*Kwikon Co..... 81

Leviton Mfg. Co..... 31

*McGill Mfg. Co..... 70
McGraw-Hill Book Co.....60, 82
Metropolitan Device Corp..... 1
Minerallac Electric Co..... 68
*Multi Elec. Mfg. Co..... 82

National Plastics, Inc..... 60

Okonite Co..... 25
*Overbagh & Ayres Mfg. Co..... 66

*Paine Co., The..... 46
*Porcelain Products, Inc..... 61

*Rattan Mfg. Co..... 61
*Reliance Automatic Lighting Co.. 66
Ridge Tool Co., The..... 44
Russell & Stoll Co..... 75

*Sangamo Electric Co..... 73
*Sherman Mfg. Co., H. B..... 70
Signal Elec. Mfg. Co..... 70
Speedway Mfg. Co..... 48
Square D Company..Inside Back Cover
Steel & Tubes, Inc.....42, 43
*Super Tool Co..... 48
Superior Carbon Prod. Inc..... 47

Thomas & Betts Co., The..... 53
Trico Fuse Mfg. Co..... 46

*United States Rubber Co..... 29

*Westinghouse Elec. & Mfg. Co. 2, 3, 69
*Wheeler Reflector Co..... 30
*Wolverine Tube Co..... 62

Youngstown Sheet & Tube Co.... 67

*See 1939-1940 Buyers' Reference number of Electrical Contracting for additional information on these companies and their products.

KIRKLAND Switch-Plate-Lamp

WRITE FOR CATALOG ON KIRKLAND BULLS-I-UNITS

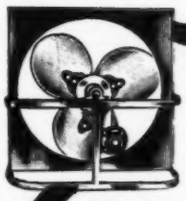
Model #1808 Switchplate Lamp. Mounts on a single gang box. Also furnished without switchplate for single hole panel mounting.

A real Lamp in a Switchplate. Ideal where modest light and low current consumption is desired, (3, 6, or 15 watt lamp).

Contractors everywhere are using Kirkland Bulls-I-Units to build Lamp Annunciators.

Sold nationally by

THE GRAYBAR ELECTRIC CO.
The H. R. KIRKLAND CO., Morristown, N. J.



"FRIGID" ATTIC COOLER

- Welded Steel Frames
- Patented "Quiet" Blades
- Motors Equipped With G.E. "Thermo-Tectors"
- Certified Ratings
- Quiet, Smooth Operation
- Simple Installation
- Rubber Mounted Motors and Housings
- Economical Operation

Write For Information & Prices

CIRCULATORS & DEVICES MFG. CORP.
100 PRINCE STREET NEW YORK, N. Y.

TEST-O-LITE

Tests Everything Electrical From 100 to 550 Volts

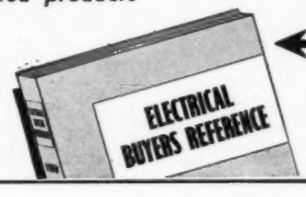
Indispensable to electricians. Equipped with Neon light which tells instantly where trouble lies in electric circuits, fuses, cut-outs, motors, radios, electric appliances; indicates hot or grounded wires; tells A.C. from D.C.

Only Test-O-Lite, original Neon tester, has exclusive patented safety features. Far superior to clumsy test bulb. Fountain pen size with pocket clip. Useful in home also. List $1.50 at leading jobbers.

L. S. BRACH MANUFACTURING CORPORATION
57 Dickerson St., Newark, N. J.

USE IT TO SAVE TIME and MONEY

A complete directory of manufacturers of electrical and allied products



A NICE JOB • • BY A GOOD CONTRACTOR • •

and it's ALL SQUARE D

POWER PANEL • SWITCHES • MOTOR CONTROL • SQUARE-DUCT

● Here is an installation of Square D electrical equipment of which both the electrical contractor and the factory owner can be proud. It shows exceptionally good planning.

It is ALL Square D. It received a lot of favorable comment from inspectors and industrial plant engineers. It was a real boost for the contractor. Square D provides a *complete* line—uniform in quality and including all equipment for power distribution and motor control in the industrial plant—switches, power and lighting panelboards, circuit breakers, motor control and SQUARE-Duct . . . Square D electrical equipment is available through electrical wholesalers everywhere.

CALL IN A SQUARE D MAN

SQUARE D COMPANY

DETROIT - MILWAUKEE - LOS ANGELES

IN CANADA: SQUARE D COMPANY CANADA LIMITED, TORONTO, ONTARIO

Isn't it possible that many electrical contractors are suffering from the same timidity that prevented Tom from asking Mary to be his bride? Contractors continue to take minimum wiring jobs when, in many cases, they could sell adequate jobs if they'd just ask their customers to consider better wiring. These customers may not even know the advantages of adequate wiring.

AN AID TO BOLDNESS

General Electric makes it easy for contractors doing home wiring to be bold by providing a wiring plan, G-E Home Wiring, that is easy to explain. It will catch the customers' imagination and will provide complete wiring. G-E Home Wiring specifies large enough wire sizes, plenty of outlets and an efficient wiring plan.

ANOTHER AID TO BOLDNESS

Moreover, the use of G-E Wiring Materials will help all contractors to be bold. Your customers know that the name, General Electric, stands for quality and dependability. Your use of these materials will help build prestige and confidence. The G-E line of conduit, wiring devices, and wire and cable is complete. You will find exactly the materials you need for any job.

For further information about G-E Wiring Materials or G-E Home Wiring, see the nearest G-E Merchandise Distributor or write to Section CDW-0127, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.

GENERAL ELECTRIC